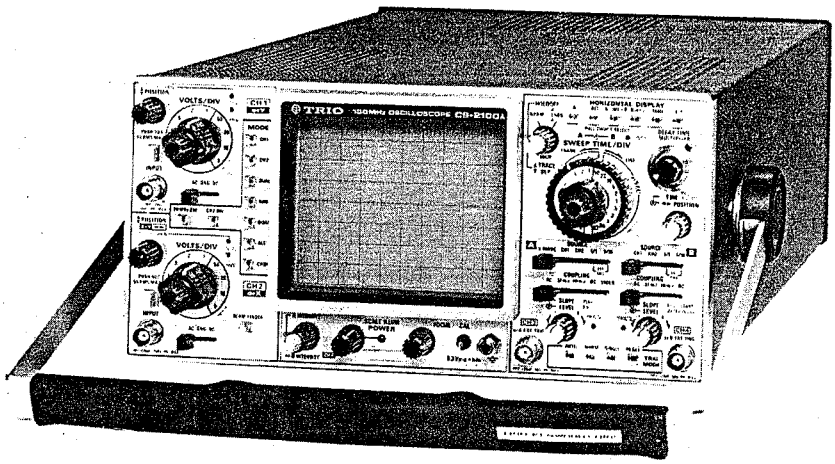
DELAYED SWEEP OSCILLOSCOPE

# CS-2100A

## 100MHz 4-CHANNEL OSCILLOSCOPE




Serial Number 2110001~3030200

TRIO

# CONTENTS


**SPECIFICATIONS** ..... 1-1

**CIRCUIT DESCRIPTION** ..... 2-1

BLOCK DIAGRAM ..... 2-5

**MAINTENANCE** ..... 3-1

REMOVAL OF CASE ..... 3-1

REMOVING/INSTALLING CRT ..... 3-1

TROUBLESHOOTING ..... 3-1

REPLACING SWITCHING POWER SUPPLY ..... 3-2

REPLACING BATTERY ..... 3-2

**ADJUSTMENT** ..... 4-1

ADJUSTMENT OF POWER SUPPLY AND CRT ..... 4-2

ADJUSTMENT OF VERTICAL AXIS (I) ..... 4-5

ADJUSTMENT OF A, B TRIG AMPLIFIER ..... 4-9

ADJUSTMENT OF VERTICAL AXIS (II) ..... 4-10

ADJUSTMENT OF HORIZONTAL SWEEP ..... 4-12

ADJUSTMENT OF X-Y OPERATION ..... 4-16

ADJUSTMENT OF TRIGGERING ..... 4-16

OPERATING CHECKS ..... 4-19

**TROUBLESHOOTING** ..... 5-1

**PARTS LIST AND DISASSEMBLY** ..... 6-1

MAIN CHASSIS ..... 6-1

VERTICAL ATTENUATOR ..... 6-9

VERTICAL PREAMPLIFIER ..... 6-11

VERTICAL OUTPUT AMP ..... 6-17

SWEEP ROTARY ..... 6-18

TRIG SWEEP ..... 6-19

HORIZONTAL OUTPUT AMP ..... 6-25

HORIZONTAL MODE CONTROL ..... 6-26

A TRIG SWITCH ..... 6-28

B TRIG SWITCH ..... 6-29

POWER BLANKING ..... 6-30

**PC BOARD AND SCHEMATIC DIAGRAM** ..... 7-1

VERTICAL ATTENUATOR ..... 7-2

VERTICAL PREAMPLIFIER ..... 7-4

VERTICAL OUTPUT AMP ..... 7-6

SWEEP ROTARY ..... 7-8

TRIG SWEEP ..... 7-10

HORIZONTAL OUTPUT AMP ..... 7-12

HORIZONTAL MODE CONTROL ..... 7-14

A TRIG SWITCH ..... 7-16

B TRIG SWITCH ..... 7-18

POWER BLANKING ..... 7-20

**SEMICONDUCTOR** ..... 8-1

# SPECIFICATIONS

**CRT**

| | |
|---|---|
| Model: | 150ATM31A |
| Display area: | 8 × 10 div (1 div = 1 cm) |
| Type: | Rectangular, with internal graticule |
| Accelerating potential: | 16kV |

**VERTICAL AXIS (Channel 1 and Channel 2 identical specifications)**

| | |
|---|---|
| Sensitivity: | 5 mV/div to 5V/div (X1 mode)<br>1 mV/div to 1V/div (X5 mode)<br>500 μV/div (Cascaded operation, CH1 to CH2) |
| Accuracy: | ±3% (10 ~ 35°C)<br>±5% (0 ~ 50°C)<br>±8% (Cascaded operation, CH1 to CH2) |
| Attenuator: | 5 mV/div to 5V/div in 1-2-5 sequence, all 10 ranges with fine adjustment. |
| Input resistance: | 1 MΩ ±2% (1 MΩ mode)<br>50Ω ±2% (50Ω mode) |
| Input capacitance: | Approx. 28pF |
| Frequency response: | (Include × 5 GAIN mode) |
| DC: | DC to 100 MHz (−3 dB)<br>DC to 120 MHz (−6 dB)<br>DC to 70 MHz (−3 dB), (Cascaded operation, CH1 to CH2) |
| AC: | 5 Hz to 100 MHz (−3 dB)<br>5 Hz to 120 MHz (−6 dB)<br>7 Hz to 70 MHz (−3 dB), (Cascaded operation, CH1, to CH2) |
| Risetime: | 3.5ns |
| Signal delay time: | Approx 30ns as displayed on CRT screen |
| Crosstalk: | −40 dB minimum |
| Operating modes: | |
| CH1 | CH1, single trace |
| CH2 | CH2, single trace |
| DUAL | CH1 and CH2, dual trace |
| ADD | CH1 + CH2 (added) display |
| QUAD | CH1 ~ CH4, four trace |
| ALT | Two or four waveforms, alternating |
| CHOP | Two or four waveforms, chopped |
| CHOP frequency: | Approx 250 kHz, switchable |
| Polarity reversal: | CH2 only |
| Maximum input voltage: | 500 Vp-p or 250V (DC + AC peak) in 1 MΩ mode.<br>5 Vrms or DC ±5V in 50Ω mode. |
| Maximum undistorted amplitude: | 8 division, minimum (DC to 100 MHz) |
| Bandwidth limiting: | Vertical system bandwidth with the 20 MHz BW pushbutton switch pushed is approximately 20 MHz |

**VERTICAL AXIS (Channel 3 and Channel 4 common specifications)**

| | |
|---|---|
| Sensitivity: | 0.1V/div, 1V/div ±3% |
| Attenuator: | 1/1, 1/10 |
| Input resistance: | 1 MΩ ±2% |
| Input capacitance: | Approx. 28 pF |
| Input coupling mode: | DC only |
| Frequency response: | DC to 100 MHz (−3 dB)<br>DC to 120 MHz (−6 dB) |
| Risetime: | 3.5ns |
| Signal delay time: | Same as CH1 and CH2 |
| Maximum allowable voltage | |
| DC component: | ±0.5V or less (AC + DC)<br>(±5V, 1/10 attenuated) |
| AC component: | 1 Vp-p (10 Vp-p, 1/10 attenuated) or less |
| Maximum input voltage: | 50V (DC + AC peak) |

**HORIZONTAL AXIS (CH2 input)**

| | |
|---|---|
| Modes: | X-Y mode is switch selectable (HORIZONTAL DISPLAY) |
| X-Y mode: | CH1: Y-axis<br>CH2: X-axis |
| Sensitivity: | Same as CH2 |
| Accuracy: | Same as CH2 |
| Input resistance: | Same as CH2 |
| Input capacitance: | Same as CH2 |
| Frequency response: | |
| DC: | DC to 5 MHz (−3 dB)<br>DC to 6 MHz (−6 dB) |
| AC: | 5 Hz to 5 MHz (−3 dB)<br>5 Hz to 6 MHz (−6 dB) |
| X-Y phase difference: | Less than 3° at 100 kHz |

**SWEEP**

Modes (switchable with the HORIZONTAL DISPLAY switch):

| | |
|---|---|
| A | A Sweep |
| ALT | B Sweep waveform is displayed as an intensified portion of the A Sweep and B Sweep alternating |
| A-INT-B | Duration of the B Sweep is displayed as an intensified portion of the A Sweep. |
| B DLY'D | Delayed B sweep |
| DUAL | Dual sweep — A and B sweeps, in dependently |
| X-Y | X-Y display mode |

# SPECIFICATIONS

A Sweep time: 20ns/div to 0.5s/div in 23 ranges, in 1-2-5 sequence, verninier control provides fully adjustable sweep time between steps.

B Sweep time: 20ns/div to 50ms/div in 20 ranges, in 1-2-5 sequence.

Accuracy: ±3% (10 ~ 35°C)
±6% (0 ~ 50°C)

Sweep magnification: X10 ±5% (10 ~ 35°C)
±7% (0 ~ 50°C)

Linearity: 20ns/div to 0.5s/div ±3%
(±5% with X10 magnification)

HOLDOFF: Continuously adjustable for A Sweep hold off time from NORM to X5

Trace separation: B positionable up to 4 divisions separated from A Sweep, continuously adjustable.

Delay method: Continuous delay, SYNC delay

Delay time: 0.2 to 10 times the sweep time from 200ns to 0.5s, continuously adjustable.

Time difference measurement accuracy:
±2% (10 ~ 35 °C)
±4% (0 ~ 50°C)

Delay jitter: 1/20000 of the full scale sweep time.

## TRIGGERING

### A TRIG

A trigger modes: AUTO, NORM, SINGLE,
FIX: at the center of the waveform

Trigger source: V MODE, CH1, CH2, (EXT) CH3
1/1 and 1/10

Coupling modes: AC, LFREJ, HFREJ, DC, VIDEO
VIDEO-LINE sync automatically selected at sweep times of 50 μs/div to 20ns/div.
VIDEO-FRAME sync automatically selected at sweep times of 0.5s/div to 0.1ms/div.

Trigger level: ±90° adjustable

Polarity: +/−

### B TRIG

B trigger modes: STARTS AFTER DELAY, TRIGGERABLE AFTER DELAY

Trigger source: CH1, CH2, (EXT) CH4 1/1 and 1/10

Coupling modes: AC, LFREJ, HFREJ, DC

Trigger level: ±90° adjustable

Polarity: +/−

Trigger sensitivity (A and B)

| COUPLING | FREQ RANGE | MINIMUM SYNC AMPLITUDE | | |
|---|---|---|---|---|
| | | INT | EXT | EXT1 10 |
| DC | DC ~ 20 MHz<br>DC ~ 50 MHz<br>DC ~ 100 MHz | 0.5div<br>1 0div<br>1 5div | 50 mV<br>100 mV<br>150 mV | 0.5V<br>1 0V<br>1 5V |
| AC | Same as for DC but with increased minimum level for below 20 Hz | | | |
| AC HFREJ | Increased minimum level below 20 Hz and above 30 kHz | | | |
| AC LFREJ | Increased minimum level below 30 kHz | | | |
| VIDEO | FRAME LINE | 0 5div | 50 mV | 0 5V |

AUTO: Same as above specifications for above 30 Hz.

FIX: 40 Hz~20 MHz 1.0 div (100 mV)
40 Hz~80 MHz 1.5 div (150 mV)

Jitter: 0.5ns maximum at 100 MHz at 2ns/div sweep rate (X10 MAG on)

## CALIBRATING VOLTAGE AND CURRENT

1 kHz ±3% Positive square wave
0.3V ±1% (10 ~ 35 C)
±2% (0 ~ 50 C)
10 mA ±2% (10 ~ 35 C)
±4% (0 ~ 50 C)

## INTENSITY MODULATION

Input signal: TTL level, intensity increasing with more positive levels

Input impedance: Approx. 10 kΩ

Usable frequency range: DC to 10 MHz

Maximum input voltage: 50V (DC + AC peak)

## VERTICAL AXIS OUTPUT

Sampled CH1 output

Output voltage: 50 mVp-p/div (into 50Ω load)

Output impedance: Approx. 50Ω

Frequency response: DC to 100 MHz (−3 dB) (into 50Ω load)

## GATE OUTPUT (A and B)

Output voltage: Approx. 1.5V positive gate (into 500Ω load)

## TRACE ROTATION

Electrical, adjustable

## POWER SUPPLY

Line voltage: LOW: 90 ~ 132V
HIGH: 180 ~ 264V

Line frequency: 50/60 Hz

Power consumption: Approx. 56W

## DIMENSIONS

Width: 284 mm (328 mm)

Height: 138 mm (150 mm)

Depth: 400 mm (471 mm)

( ) dimensions include protrusions from basic case outline dimensions.

# SPECIFICATIONS

**WEIGHT** 7.4 kg

**ACCESSORIES**

| | |
|---|---|
| PC-29 Probes | 2 |
| Instruction Manual | 1 |
| Hand Book | 1 |
| AC power cord | 1 |
| Panel Cover | 1 |
| Probe holder | 1 |

**OPTION**

Accessory Bag (MC-78)

**ENVIRONMENT**

| | |
|---|---|
| Operating temperature and humidity for guaranteed specifications: | 10 ~ 35°C, 85% maximum RH |
| Full operating range: | 0 ~ 50°C, 90% maximum RH |
| Storage temperature and humidity range: | −20° ~ 55°C<br>80% maximum |
| Altitude: | |
| Operating: | 5000 m |
| Non-operating: | 12000 m |

# CIRCUIT DESCRIPTION

## VERTICAL ATTENUATOR

The CS-2100A input attenuator consists of two stages of attenuation having 1/2, 1/4 and 1/10 steps and the other having either 1/10 or 1/100 attenuation to form an overall ten point attenuator in 1-2-5 sequence.
The signal from the attenuator is passed to a dual FET impedance conversion circuit (Q1). Its output is sent to IC12. Variable gain is achieved by varying the emitter resistance of IC12.
The output of IC12 is sent to the vertical pre-amp.
The arrangement for CH2 is the same as for CH1.
Each channel has a 50Ω termination that can be switch selected.

## VERTICAL MODE LOGIC CIRCUIT

Instead of the usual mechanical switches used on other instruments the CS-2100A makes use of electronic switching. The switches themselves generate a single pulse output when operated so that the various combinations of switches and holding of selected modes must be done with external logic circuitry. The circuit that accomplishes this is the Vertical Mode Logic Circuit. The pulses generated when the switches are operated are shaped by a schmitt trigger circuit and sent to the rest of the circuitry. IC6 is a latch used to hold a single pulse. The input signal, passing through the circuit formed by D5-D11 and IC3, IC2 and IC7 is a delayed pulse which acts as the trigger for IC6. In this way IC6 holds the data that represents the fact that a switch has been depressed. IC4 acts as a logical single pole double throw switch to select one of DUAL/QUAD and ALT/CHOP. CH2 inverter and 20MHz BW switching functions are managed (ON-OFF) by IC10 which acts as a SPST switch. The output of IC4 is also latched into IC6. The output of IC6 is used to drive the vertical mode LED's through IC8, IC11, IC5 and IC9.

## VERTICAL PRE-AMP CIRCUIT

The CS-2100A has four pre-amp circuits to allow 4-channel operation. The output of the vertical attenuator is fed to IC1, an amplifier.
For CH2 an inverting stage, IC2, is provided to allow switched inversion of that channel only. Q2 and Q3 form the CH1 position circuit.
Q50 and Q51 form the CH2 position circuit which operates in a similar fashion to the circuit for CH1. Q4 and Q5 are x1 amplifier stages (for CH1) and Q6, Q7 are x5 amplifier stages. The circuit formed by Q8 and Q9 is used to switch between ×1 and ×5 gain for CH1. For CH2, Q52/Q53 and Q54/Q55 along with Q56 and Q57 have the same functions. Q10/Q11 and Q19/Q20 for a cascoded amplifier.
Q18 and Q21 in combination with Q19 and Q20 form a switching circuit. This circuit is used to turn the CH1 signal on and off.
Q12 and Q13 form the trigger amplifier. The trigger signal passes through the buffer output amplifier formed by Q14 and Q15, being converted to 50Ω impedance and is sent to the A trigger switch circuit. For channel 1 only, the vertical signal passes through the stage formed by Q16 and Q17 to the rear panel connector for CH1 output. The circuit configuration for CH2, CH3 and CH4 is similar except that the CH3 and CH4 position adjustment is accomplished by means of PCB mounted trimmers VR1 and VR2.
The CH1 through CH4 signals are amplified by the output amplifier formed at the base side of the emitter follower formed by Q42 and Q43. This amplifer consists of Q44 and Q45 whose output is sent to the delay line.
Q38/Q39 and Q40/Q41 for the trigger amplifier which sends the signal of the output amplifier to the A trigger switch circuit and acts as the V MODE trigger source. Q37 acts as the load resistance switch for the ADD mode. Q33-Q36 form the 20MHz bandwidth circuit which limit the vertical bandwidth to −3dB down at 20MHz.
CH1 through CH4 signals are switched by the logic circuit formed by IC3 - IC7 in accordance with the vertical mode and horizontal mode selected.

## VERTICAL OUTPUT AMPLIFIER

The signal from the delay line is sent to the vertical output amplifier. Q1, Q2, Q3 and Q4 form a cascoded differential input amplifier. Q11 forms a bias current stabilization circuit which in conjuction with Q12 forms the beam finder circuit.
Q7 −Q10 form the final output stage.
Q5 forms the trace separation circuit.

## A TRIGGER SWITCH CIRCUIT

The CH1-CH4, V MODE signals are sent to the A trigger switch circuit. S1 is the trigger source switch with S2 acting as the trigger coupling selection switch. Q1 and Q2 form the FIX synchronization circuit, which detects the peak value of the signal and acts as an automatic trigger level control.
Q3 and Q4 form the VIDEO sync circuit which detects the trigger signal of the TV picture signal for stable display.
Q6 and Q7 form an impedance converting emitter follower circuit to lower the output impedance to drive the next stage. Q8 and Q9 form a circuit which is used to improve the CMRR. This circuit is a feedback amplifier. IC1 is a cascode amplifier used as the polarity reversal (inversion) circuit for the trigger signal. Q10 forms an impedance conversion stage used to convert the output of the IC1 stage to 50Ω for output to the horizontal sweep unit.

## B TRIGGER SWITCH CIRCUIT

Basically this circuit operates as does the A trigger switch circuit. Q1 accepts the CH2 trigger input and uses this signal to form the X signal for X-Y operation. Other aspects of operation are the same as the A trigger switch circuit.

# CIRCUIT DESCRIPTION

## SWEEP ROTARY CIRCUIT

This circuit is a part of the sweep circuit, but is located on a separate board. It is composed of a rotary switch to select the sweep time and resistors of the HOLDOFF circuit.

## HORIZONTAL SWEEP CIRCUIT

This sweep circuit uses a constant current integrated circuit to obtain sawtooth waveform by charging capacitor with constant current.

Q14, Q16, Q18 form the circuit that switches the sweep time capacitors for A sweep.

For the B sweep, this function is managed by Q43, Q45, Q47 in the same manner.

Q13, Q15 and Q17 form the circuit that switches HOLDOFF capacitor for the A sweep, and in the case of B sweep the same operation is carried out by transistors Q42, Q44 and Q46. The voltage supplied by the constant voltage circuit is converted to a constant current source by the voltage setting circuit comprised of IC3a and transistor Q8 and the resistor which is selected by the rotary switch.

This current is used to charge the sweep time capacitor, and result in a rise voltage at the capacitor terminals. This voltage is sent to a high impedance buffer amplifier composed of Q19 and Q20.

When the output of this amplifier reaches a constant voltage value, IC7d is switched on and IC2b flip-flop is reset. At the same time IC2a is set.

The output of IC2a turns on Q7 and enshorts the sweep time capacitor. The terminal output voltage of the capacitor falls. At the same time the constant current circuit which is composed of Q22 changes one of the following HOLDOFF capacitors; C13, C19, or C23.

The terminal voltage of the capacitor increases step by step. When this terminal voltage goes beyond the threshold level Q23 is turned on. The output of Q23 turns on the SCHMIDT trigger circuit which is composed of IC2b. The output of IC2b cancels the set condition of IC2a and sweep is once again started. The trigger signal sychronizes IC2a through IC1a, IC1b. It cancels the set of the flip-flop when it is in the set state and starts the sweep which is synchronized to the trigger signal.

The SCHMIDT trigger circuit is composed of IC1a and IC1b. The trigger signal which is smoothed by IC1a and IC1b is supplied to IC1c, Q3 and Q4. When there is a trigger signal, IC1d gate is closed and IC2a operates as the master slave flip-flop.

When there is no trigger signal IC2a opens the gate of IC1d and operates R-S flip-flop. This is the auto free run circuit.

Q24 to Q26 form the delay sweep level detection circuit.

When the voltage level increases as set by DELAY TIME MULTIPLIER, Q24 is turned on and triggers IC8a gate, IC8a and IC10b compose the logic differential circuit. It makes constant width pulse which activates IC5b and starts B sweep circuit is approximately the same as A sweep circuit, but it does not have 3 low speed ranges. IC4d gate is selected from master slave flip-flop using B START AFTER DELAY switch, and has trigger priority to R-S flip-flop.

The sweep can be started from the voltage level set by the DELAY TIME MULTIPLIER. A sweep horizontal position adjustment is carried out by Q53, and B sweep by Q54. The selection of HORIZONTAL DISPLAY is carried out by Q55 to Q58. A and B sweep waveform is synthesized by Q55 and Q58 collectors and X-Y signal is also sythesized at this point by Q59.

The signal through Q60 enhances CMRR and is sent to next stage by Q62 and Q63. Q64 and Q65, and Q66 and Q67 are selected times one and times ten (x1 and x10) by Q69 and Q68 respectively. The impedance is converted to 50 ohms and is sent to the horizontal output amplifier by Q70 and Q71.

The trace SEP circuit is composed of Q78 to Q80 and two different bias voltages are sent to the vertical output amplifier by the A and B sweep signals. IC8d is the reset-pulse generator circuit in the case of signal sweep operation and also produces the blanking control signal when it is necessary to produce horizontal display using IC13a, IC14a and IC14e.

This circuit combines the sweep and chop signal using IC11a, IC11b, IC11c, IC11d and IC12d. The impedance is converted in Q72 to Q75.

This signal becomes the input signal of the blanking circuit. The signal in the case of DUAL or QUAD setting of the vertical axis mode produced in IC12a, IC12b, IC13b, IC14c, IC14d, IC15a, IC15b, IC15c and IC15d and D48 to D50.

IC12a and IC12b comprise the chop oscillator. The vertical mode logic and horizontal mode logic signal switch this oscillator on and off. In the case of oscillation stopping this oscillator produces an alternate signal output.

On receiving a signal from IC14e, the output of IC12a and IC12b is turned off in the case of vertical axis single trace operation by IC15d.

However this output can be supplied in another case. The output of Q77 is supplied to the vertical amplifier and the output is separated into chop and alternate signals.

## HORIZONTAL MODE CONTROL CIRCUIT

The switch states are latched by IC4 and IC7 which effectively makes these non-locking switches into locking types functionally.

For horizontal display D1-D9 and IC1d—IC1f are used to hold 3 bits of coded status information. Waveform shaping is used in the IC1 circuit to prevent misoperation. Diodes D10—D12 and IC2c—IC2e and IC3d form a circuit that is used to detect what switch of the horizontal group has been depressed.

The detected switch data is entered into the register IC4 which then holds the switch status. IC5 is a tri-state buffer. IC6 is used to restore the encoded switches status information on a one to one basis for all functions. Switch status held until a particular switch is pressed for a second time.

The output of IC6 is used to drive an LED and as a control signal for blanking and sweep switching. The operation of the trigger mode switch input is the same as for the horizontal display switch group. Diodes D13-D16 and IC1a and IC1b are used to encode 2 bits of switch status information for this switch group after pulse shaping is done. D17, D18 IC2a, IC2b, IC2f and IC3a determine whether an input is present, writing into the register IC7a and IC7b the appropriate status information.

This register holds the switch status encoded information until IC8 is used to cancel, or return the status information based on alternate operation of the switches. Similar to the horizontal display switch group, once depressed a switch mode is maintained until the switch is depressed once more. IC5a, IC5b, and IC5c are tri-state buffers. IC9a, IC9b, and IC9d—IC9f along with Q1—Q3 form buffers for the switch LED's and sweep circuit. The output from the trigger mode reset switch is pulse shaped and sent to the trigger sweep circuit.

This circuit holds data even when the instrument's power supply switch is turned OFF. That control is performed by Q4, D19, D20, IC3 and IC8a.

D19 and D20 form a power supply based on the internal lithium battery for memory backup. IC3b and IC3c detect the power OFF condition and generate a memory save signal. The output of the above circuit forms the set of control signals used to control the vertical mode logic circuitry.

## CALIBRATING VOLTAGE CIRCUIT

Q11 and Q12 form a multivibrator circuit which generates a signal which is subsequently converted to a low impedance by means of Q10 for output as the calibration signal. It is also used for creation of a current calibration signal by means of R70 and R71. The current calibration signal is output via a rear panel terminal. IC17 is used to regulate the voltage generated by this calibration circuit.

## CH3 and CH4 INPUT CIRCUITS

These circuits consist of an attenuator and buffer amplifier. Q16 drives a relay to switch the attenuation between 1/1 and 1/10. The signal from the attenuator is impedance converted with the circuit formed by Q13a, Q13b, Q14 and Q15 and sent to the vertical pre-amplifier. The operation and configuration of the CH4 circuit is similar to the CH3 circuit.

## HORIZONTAL OUTPUT AMPLIFIER

The signal from the horizontal sweep circuit is amplified by the differential amplifier formed by Q1 and Q2. The output signal of this circuit is then passed to the emitter follower circuit formed by Q5 and Q6 for impedance conversion to enable driving the circuit formed by Q7 and Q8. Q9 and Q10 form a voltage regulation circuit which serves as the DC load for Q7 and Q8 respectively with AC peaking performed by means of C15 and C16. Q11 and Q12 form an auto-bias circuit which automatically controls the operating point of the output stage. It also serves as the beam finder circuit such that when the base of Q13 is grounded the operating point of the output stage is lowered, resulting in a shrunken display.

## SWITCHING POWER SUPPLY UNIT

Although the CS-2100A is light and compact, and make use of a switching regulator type power supply.

Input of either 100V of 200V is rectified and a smoothing capacitor is used to generate a smooth DC output of approximately 200V.

Next, a power transistor is used to convert this output to an AC voltage which is used to drive a compact type converter transformer. The transformer used has 6 bifilar windings which create six separate outputs which are then rectified and smoothed to provide the supply for the blanking unit directly. One of the outputs is compared with a reference voltage to form an error voltage used for regulation. The error voltage is sent to the error voltage amplifier, the output of which is used to control the base of the power transistor. This output is isolated from the primary by means of a photocoupler.

## POWER BLANKING UNIT

The five remaining outputs from the switching regulator power supply are further regulated using a series regulation method. This accomplished with Q1, Q3—Q6. IC1a, IC1b, IC2a and IC2b are error voltage amplifiers. The +20V derived by use of a resistance voltage divider. A conventional high voltage DC-DC converter is used. Q25—Q27 are error voltage amplifiers with Q29 acting as a control transistor. The CS-2100A provides independent A and B sweep intensity controls. This function is implemented by means of the circuit formed by Q13—Q15. Q16 forms the beam finder circuit which allows the beam to be seen even if the intensity control has been inadvertently turned to minimum. Q17 forms the external intensity (Z-axis) modulation circuit which accepts an input and results in brighter displays for increasing inputs.

The signals from these circuits are combined at the base of Q18 to drive Q19. Q20 forms the DC load for Q19 with C25 acting to provide AC peaking for this circuit. Q21 and Q22 form the auto-focus circuit which apply a signal to the focus electrodes of a reverse phase from the blanking signal. Q23 and Q24 act to restore the DC component of the blanking and auto-focus circuits by using differential amplifiers for isolation. Q8 controls scale illumination with Q9 and Q10 controlling the adjustment of trace rotation. Q11 and Q12 are used to adjust perpendicularity.

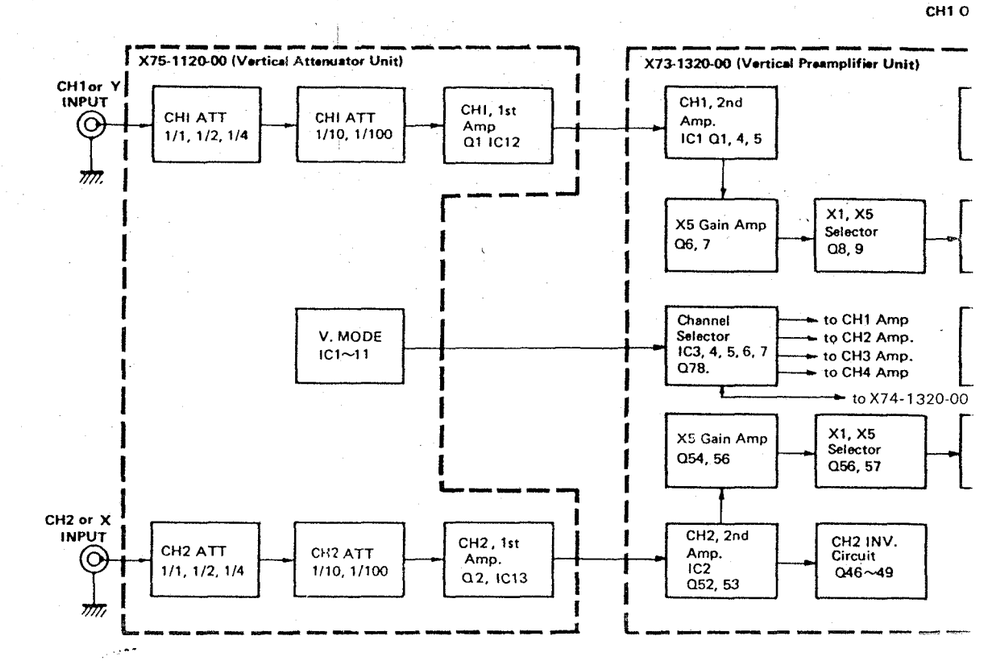
# CIRCUIT DESCRIPTION

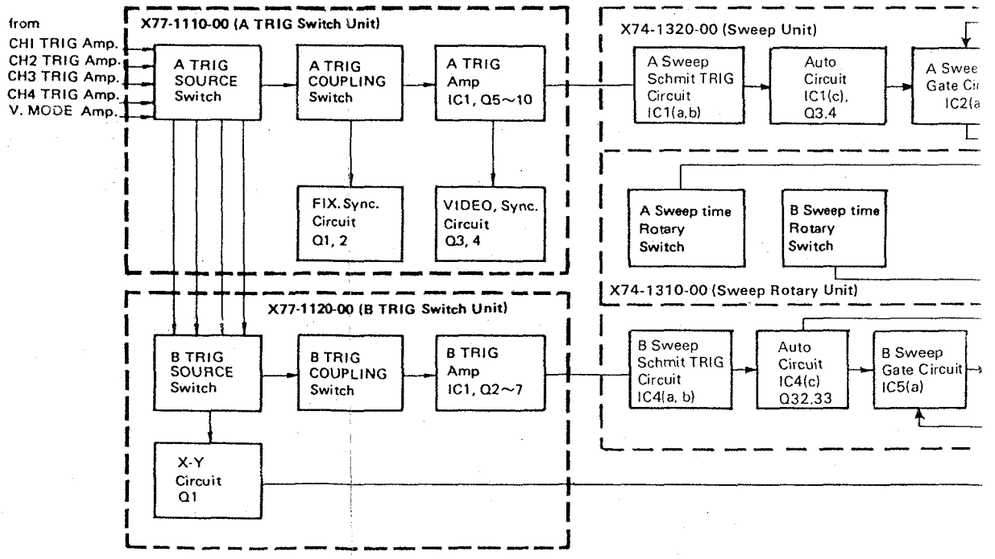
## HIGH VOLTAGE UNIT

The post-acceleration voltage of the CS-2100A is 16kV requiring the high voltage unit to be protected from the hands of the user if safety is to be maintained.

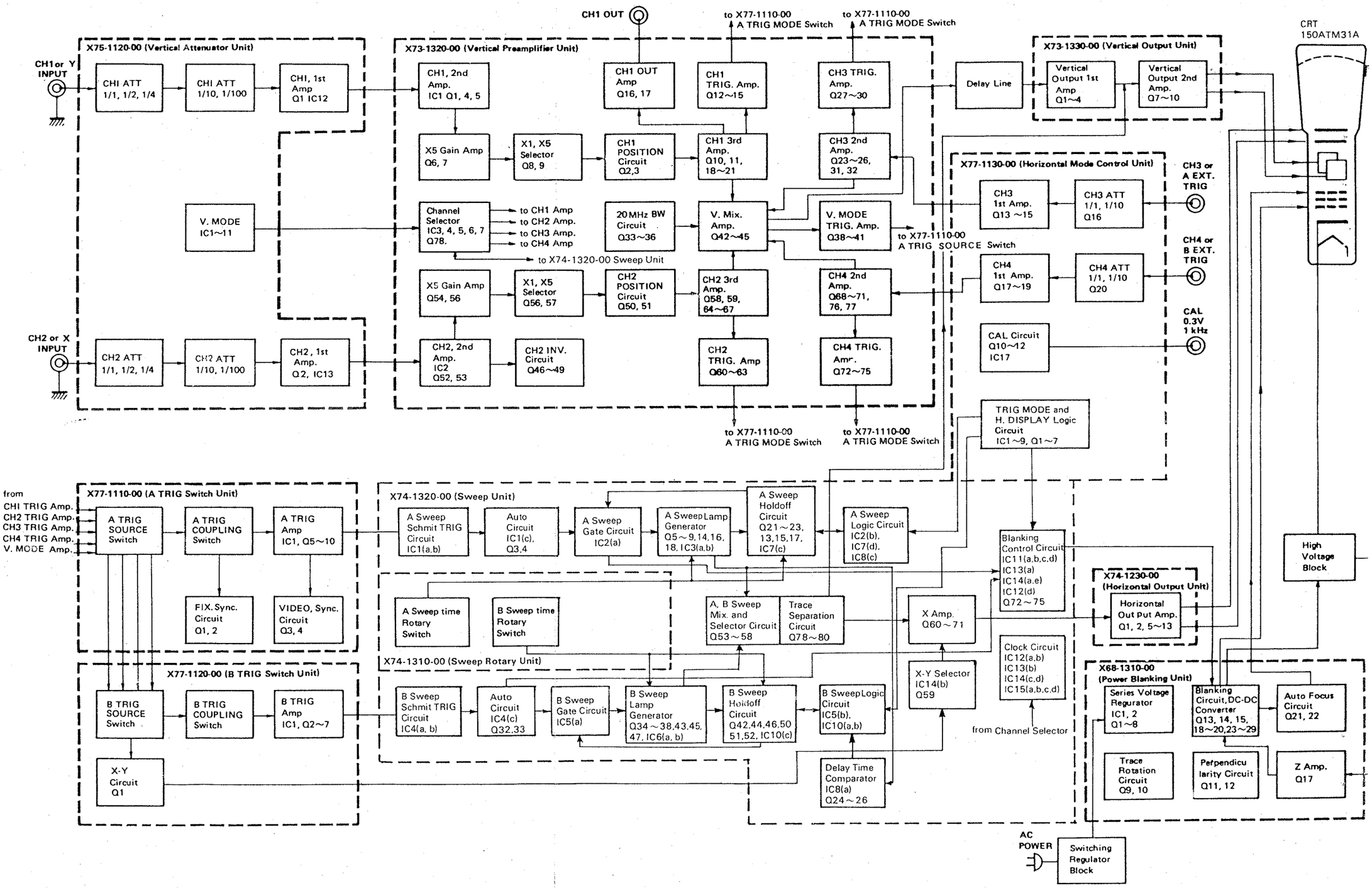
This protection also is required to prevent leakage.

To achieve this goal, the high voltage unit of the CS-2100A has been encapsulated in resin to form a high voltage "block". In the block are the high voltage DC to DC converter as well as the 1.75kV cathode voltage supplies rectifier. In addition to the anode cap which makes available 14kV, the block has 1.75kV DC and 6.3V AC outputs.


CH1 O
X75-1120-00 (Vertical Attenuator Unit)
X73-1320-00 (Vertical Preamplifier Unit)
CH1or Y INPUT
CHI ATT 1/1, 1/2, 1/4
CHI ATT 1/10, 1/100
CHI, 1st Amp Q1 IC12
CH1, 2nd Amp. IC1 Q1, 4, 5
X5 Gain Amp Q6, 7
X1, X5 Selector Q8, 9
V. MODE IC1~11
Channel Selector IC3, 4, 5, 6, 7 Q78.
to CH1 Amp
to CH2 Amp.
to CH3 Amp.
to CH4 Amp
to X74-1320-00
X5 Gain Amp Q54, 56
X1, X5 Selector Q56, 57
CH2 or X INPUT
CH2 ATT 1/1, 1/2, 1/4
CH2 ATT 1/10, 1/100
CH2, 1st Amp. Q2, IC13
CH2, 2nd Amp. IC2 Q52, 53
CH2 INV. Circuit Q46~49


from
CHI TRIG Amp.
CH2 TRIG Amp.
CH3 TRIG Amp.
CH4 TRIG Amp.
V. MODE Amp.
X77-1110-00 (A TRIG Switch Unit)
A TRIG SOURCE Switch
A TRIG COUPLING Switch
A TRIG Amp IC1, Q5~10
FIX. Sync. Circuit Q1, 2
VIDEO, Sync. Circuit Q3, 4
X74-1320-00 (Sweep Unit)
A Sweep Schmit TRIG Circuit IC1(a,b)
Auto Circuit IC1(c), Q3,4
A Swee Gate Ci IC2(a
A Sweep time Rotary Switch
B Sweep time Rotary Switch
X74-1310-00 (Sweep Rotary Unit)
X77-1120-00 (B TRIG Switch Unit)
B TRIG SOURCE Switch
B TRIG COUPLING Switch
B TRIG Amp IC1, Q2~7
X-Y Circuit Q1
B Sweep Schmit TRIG Circuit IC4(a, b)
Auto Circuit IC4(c) Q32,33
B Sweep Gate Circuit IC5(a)

# BLOCK DIAGRAM

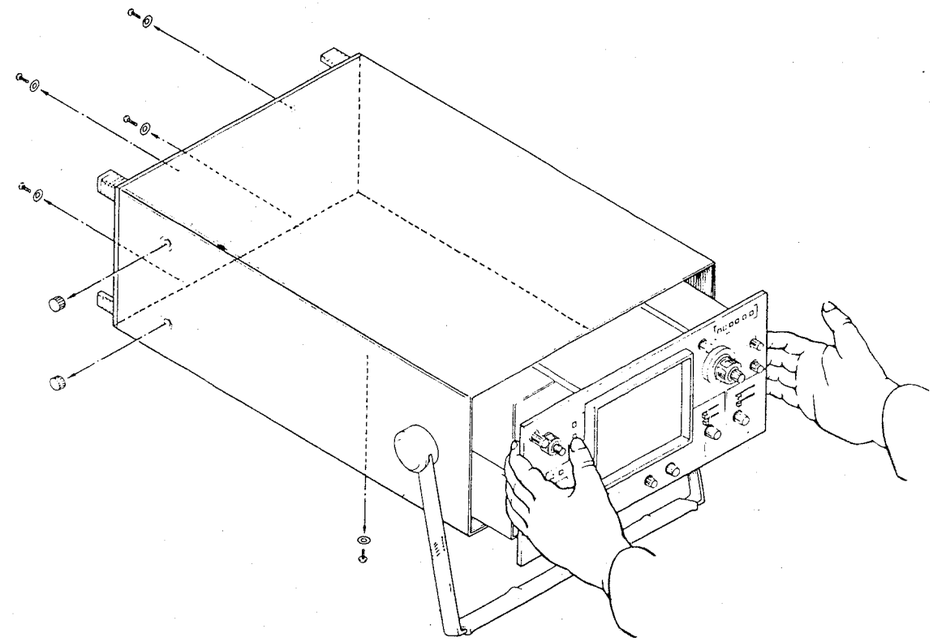

CH1 OUT
to X77-1110-00 A TRIG MODE Switch
to X77-1110-00 A TRIG MODE Switch
CRT 150ATM31A
X75-1120-00 (Vertical Attenuator Unit)
CH1 or Y INPUT
CH1 ATT 1/1, 1/2, 1/4
CH1 ATT 1/10, 1/100
CH1, 1st Amp Q1 IC12
V. MODE IC1~11
CH2 or X INPUT
CH2 ATT 1/1, 1/2, 1/4
CH2 ATT 1/10, 1/100
CH2, 1st Amp. Q2, IC13
X73-1320-00 (Vertical Preamplifier Unit)
CH1, 2nd Amp. IC1 Q1, 4, 5
X5 Gain Amp Q6, 7
X1, X5 Selector Q8, 9
Channel Selector IC3, 4, 5, 6, 7 Q78.
to CH1 Amp
to CH2 Amp.
to CH3 Amp.
to CH4 Amp
to X74-1320-00 Sweep Unit
X5 Gain Amp Q54, 56
X1, X5 Selector Q56, 57
CH2, 2nd Amp. IC2 Q52, 53
CH2 INV. Circuit Q46~49
CH1 OUT Amp Q16, 17
CH1 POSITION Circuit Q2,3
20MHz BW Circuit Q33~36
CH2 POSITION Circuit Q50, 51
CH1 TRIG. Amp. Q12~15
CH1 3rd Amp. Q10, 11, 18~21
V. Mix. Amp. Q42~45
CH2 3rd Amp. Q58, 59, 64~67
CH2 TRIG. Amp Q60~63
CH3 TRIG. Amp. Q27~30
CH3 2nd Amp. Q23~26, 31, 32
V. MODE TRIG. Amp. Q38~41
CH4 2nd Amp. Q68~71, 76, 77
CH4 TRIG. Amp. Q72~75
to X77-1110-00 A TRIG MODE Switch
to X77-1110-00 A TRIG MODE Switch
Delay Line
X73-1330-00 (Vertical Output Unit)
Vertical Output 1st Amp Q1~4
Vertical Output 2nd Amp. Q7~10
X77-1130-00 (Horizontal Mode Control Unit)
CH3 1st Amp. Q13 ~15
CH3 ATT 1/1, 1/10 Q16
CH3 or A EXT. TRIG
CH4 1st Amp. Q17~19
CH4 ATT 1/1, 1/10 Q20
CH4 or B EXT. TRIG
to X77-1110-00 A TRIG SOURCE Switch
CAL Circuit Q10~12 IC17
CAL 0.3V 1 kHz
TRIG MODE and H. DISPLAY Logic Circuit IC1~9, Q1~7
from
CH1 TRIG Amp.
CH2 TRIG Amp.
CH3 TRIG Amp.
CH4 TRIG Amp.
V. MODE Amp.
X77-1110-00 (A TRIG Switch Unit)
A TRIG SOURCE Switch
A TRIG COUPLING Switch
A TRIG Amp IC1, Q5~10
FIX. Sync. Circuit Q1, 2
VIDEO, Sync. Circuit Q3, 4
X77-1120-00 (B TRIG Switch Unit)
B TRIG SOURCE Switch
B TRIG COUPLING Switch
B TRIG Amp IC1, Q2~7
X-Y Circuit Q1
X74-1320-00 (Sweep Unit)
A Sweep Schmit TRIG Circuit IC1(a,b)
Auto Circuit IC1(c), Q3,4
A Sweep Gate Circuit IC2(a)
A Sweep Lamp Generator Q5~9,14,16, 18, IC3(a,b)
A Sweep Holdoff Circuit Q21~23, 13,15,17, IC7(c)
A Sweep Logic Circuit IC2(b), IC7(d), IC8(c)
A Sweep time Rotary Switch
B Sweep time Rotary Switch
A, B Sweep Mix. and Selector Circuit Q53~58
Trace Separation Circuit Q78~80
X74-1310-00 (Sweep Rotary Unit)
B Sweep Schmit TRIG Circuit IC4(a, b)
Auto Circuit IC4(c) Q32,33
B Sweep Gate Circuit IC5(a)
B Sweep Lamp Generator Q34~38,43,45, 47, IC6(a, b)
B Sweep Holdoff Circuit Q42,44,46,50 51,52, IC10(c)
B Sweep Logic Circuit IC5(b), IC10(a,b)
Delay Time Comparator IC8(a) Q24~26
X Amp. Q60~71
X-Y Selector IC14(b) Q59
Blanking Control Circuit IC11(a,b,c,d) IC13(a) IC14(a,e) IC12(d) Q72~75
Clock Circuit IC12(a,b) IC13(b) IC14(c,d) IC15(a,b,c,d)
from Channel Selector
X74-1230-00 (Horizontal Output Unit)
Horizontal Out put Amp. Q1, 2, 5~13
High Voltage Block
X68-1310-00 (Power Blanking Unit)
Series Voltage Regurator IC1, 2 Q1~8
Blanking Circuit, DC-DC Converter Q13, 14, 15, 18~20,23~29
Auto Focus Circuit Q21, 22
Trace Rotation Circuit Q9, 10
Perpendicularity Circuit Q11, 12
Z Amp. Q17
AC POWER
Switching Regulator Block

# MAINTENANCE

## REMOVAL OF CASE

1. Pull out CH3 and CH4 POSITION knobs.
2. Remove the 4 screws located at the rear of the case and the 1 located at bottom with a ⊕ screwdriver. Carefully slide the body forward from the case.
3. To install the body in the case, place the case horizontally and slide the body into the case using the rails located at the bottom of the case. Then, place the body vertically and engage the case front edge into the front panel groove.
4. Temporarily insert the case retaining screws and the tighten them evenly.
5. Install the CH3 and CH4 POSITION knobs.

**CAUTION:**
A voltage of 16kV is applied to the CRT socket and anode cap. Before removing the case, turn the power off and pull out the power plug. After removing the case, take care not to touch them.



## REMOVING/INSTALLING CRT

1. When servicing CRT, do not loosen the CRT band. Only remove the CRT retaining screws, then slide the CRT backward and raise the socket. The CRT can be removed easily.
2. Insert the CRT from the socket side until the CRT comes in contact with the shield plate and tighten the CRT band retaining screws.
3. As slots are provided in the CRT bracket, the CRT can be moved right and left, and back and force.
   As the bracket is inclined by 45°, the CRT can be positioned in an arbitrary position. To fix the CRT, fix the CRT band, then fix the bracket.

**CAUTION:**
A high tension voltage is remained at the anode of the CRT. Before removing the CRT, connect the anode to the ground via a 100 kΩ load for 5 seconds to discharge the voltage.

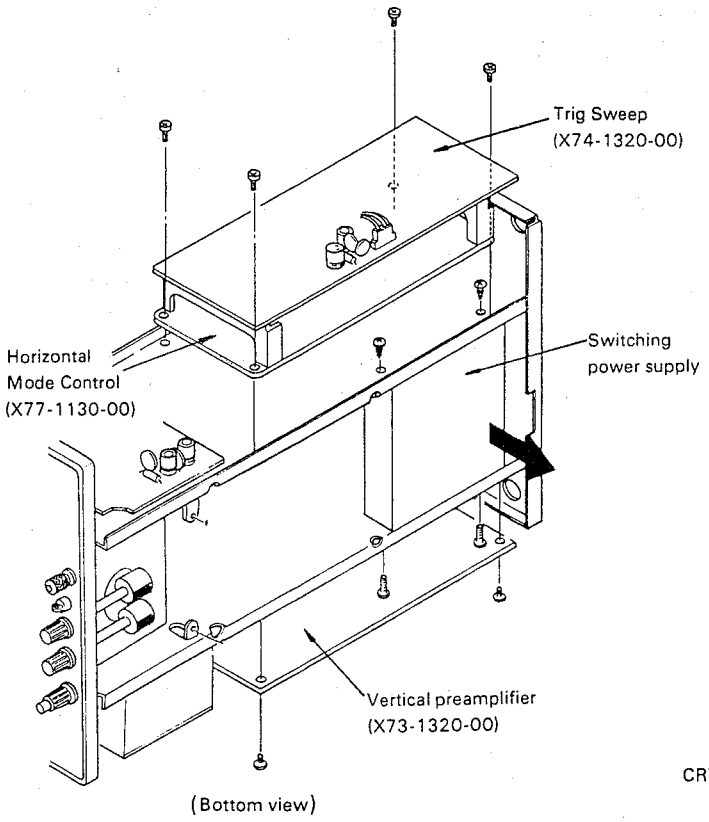
## TROUBLESHOOTING

1. Confirm that the voltage selector is set to the correct position.
2. If one of the mode LEDs does not light, the unit will not operate correctly. When using the unit, confirm that the LED lights up.
3. To service the unit effectively, isolate the failure first. Then, remove the case and check the wiring, P.C.B, pattern and parts.
4. A low voltage power supply will affect the circuitry. Do not use the low voltage power supply for checking.

# MAINTENANCE

## REPLACING SWITCHING POWER SUPPLY

The switching power supply is housed in the shield case located at the rear. To remove the switching power supply, remove the horizontal logic circuitry (right) and vertical preamplifier (left) and remove the retaining screws which fix the shield case to the frame.



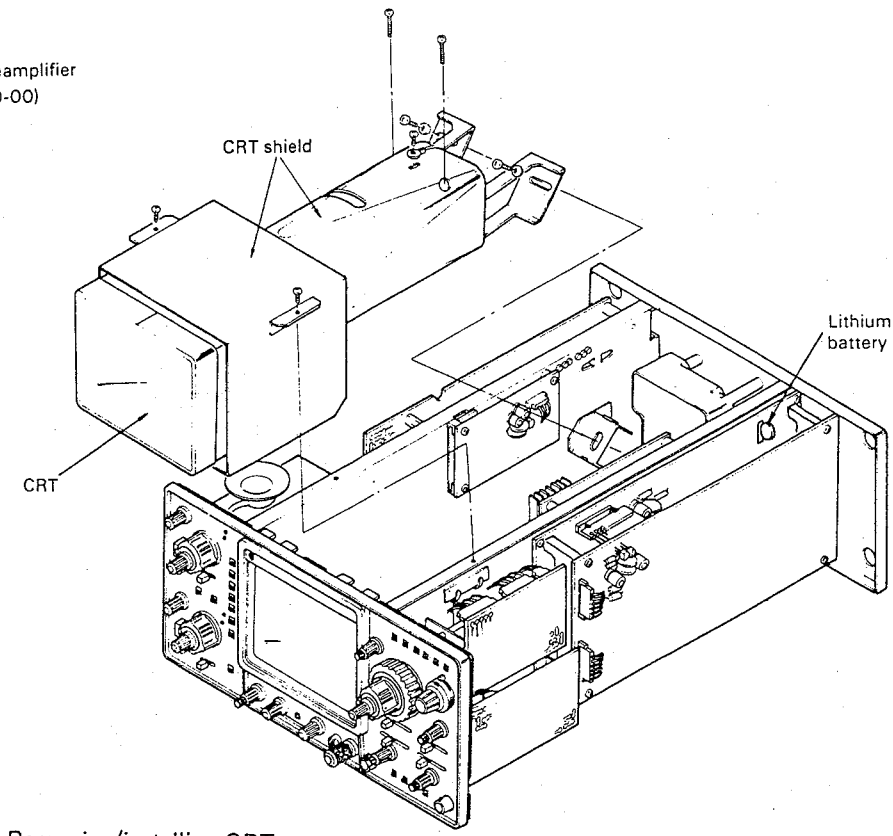

Replacing switching power supply

## REPLACING BATTERY

A disc type Lithium battery is installed in the horizontal mode control unit (X77-1130-00). The voltage of the battery is 2.7V. When the voltage drops to 2.0V, replace the battery.

Before replacing the battery, set the unit to the operation mode and confirm that each switch with built-in LED is set correctly.

To remove or install the battery, apply a soldering iron to the parts side of the P.C.B. When installing the battery, observe the polarity. The polarity is indicated on the parts side of the P.C.B.




Removing/installing CRT

# ADJUSTMENT

To obtain the best performance, periodically accurately calibrate the unit.
Sometimes, only one mode need be calibrated, while at other times, all modes should be calibrated.
When one mode is calibrated, it must be noted that the other modes may be affected. When calibrating all modes, perform the calibration in the specified sequence.
The following calibration required an accurate measuring instrument and an insulated adjusting flat blade screwdriver. If they are not available, contact your dealer.
For optimum adjustment, turn the power on and warm up the CS-2100 sufficiently (more than 30 minutes) before starting.

**CAUTION:**
Calibrate the unit under the following condition.
Temperature: 10 — 35°C
Humidity: Less than 85%

## POWER SUPPLY VOLTAGE

Before calibrating the unit, check the power supply voltage.
Voltage selector: LOW; 90 — 132V
HIGH; 180 — 264V
50/60 Hz

## TEST EQUIPMENT REQUIRED

The following instrument or their equivalent should be used for making adjustments.

| Test Equipment | Model | Minimum Specification |
|---|---|---|
| Digital Multi-Meter | DL-720 (TRIO) | Impedance: More than 10 MΩ, Measuring range: 0.01V to 199V |
| Sine-Wave Generator | SG-502 (Tektronix) | Frequency: 10 Hz to 10 MHz, constant voltage over tuning range |
| Sine-Wave Generator | SG-503 (Tektronix) | Frequency: 50 kHz to 100 MHz, Output impedance: 50Ω, constant voltage over tuning range. |
| Square-Wave Generator | PG-506 (Tektronix) | Output signal: 1 kHz, Amplitude: 10 mVp-p to 10 Vp-p, Accuracy: within ±1%, Rise time: 35ns or less (1 MHz, 1ns or less) |
| Q Meter | 4343B (YHP) | — |
| Color Pattern Generator | CG-911A (TRIO) | — |
| Oscilloscope | 475A (Tektronix) | Sensitivity: More than 5 mV Frequency response: More than 250 MHz |
| Time-Marker Generator | TG-501 (Tektronix) | Time mark: 0.5s to 0.1μs repetitive waveform, accuracy: within 0.1% |
| High-Voltage Probe | — | Input Impedance: 1000 MΩ |
| Termination | TA-57 (TRIO) | Impedance: 50Ω |
| Attenuator | 011-0059-02 (Tektronix) | —20 dB attenuation (50Ω) |
| Power Meter | 2041 (YEW) | — |
| Auto transformer (variable) | SD-265 (Matsunaga) | — |
| Current Probe | P6302 AM-503 (Tektronix) | — |
| Frequency Counter | FC-754A (TRIO) | — |

## PREPARATION FOR ADJUSTMENT

### Control Setting

The control settings listed below must be used for each adjustment procedure. Exceptions to these settings will be noted as they occur. After completing a adjustment, return the controls to the following settings.

**Power Section**

| | |
|---|---|
| POWER | ON |

**CRT Control Section**

| | |
|---|---|
| A INTEN | Between 12 and 3 o'clock position |
| B INTEN | Between 12 and 3 o'clock position |
| FOCUS | Optimum position |
| SCALE ILLUM | Arbitrary position |
| BEAM FINDER | OFF |

**Vertical Section**

| | |
|---|---|
| VARIABLE (CH1 and CH2) | CAL |
| ▲▼ POSITION (CH1 and CH2) | 12 o'clock position |
| AC-GND-DC (CH1 and CH2) | AC |
| PUSH 50Ω (CH1 and CH2) | OFF (▁) |
| VOLTS/DIV (CH1 and CH2) | 5V/DIV |
| × 5 GAIN | OFF |

**Horizontal Sweep Section**

| | |
|---|---|
| A SWEEP TIME/DIV | 0.1ms/DIV |
| B SWEEP TIME/DIV | 0.1ms/DIV |
| A VAR | CAL |
| DELAY TIME MULTIPLIER | Arbitrary position |
| ▲▼ TRACE SEP. | Fully CCW |
| HOLDOFF | NORM |
| B ENDS A | OFF |
| ◄► POSITION | 12 o'clock position |
| FINE PULL × 10 MAG | 12 o'clock position ( × 10 MAG OFF) |
| PULL CHOP F. SELECT | OFF |

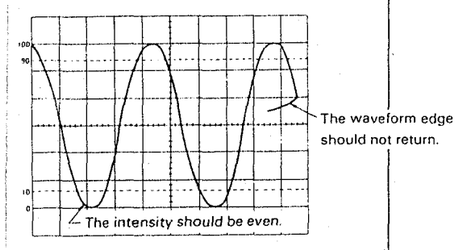
**TRIG. Section**

| | |
|---|---|
| A TRIG SOURCE | V. MODE |
| A COUPLING | AC |
| A TRIG LEVEL | 12 o'clock position |
| A TRIG SLOPE | + |
| FIX | (PUSH) |
| B TRIG SOURCE | CH1 |
| B COUPLING | AC |
| B TRIG LEVEL | 12 o'clock position |
| B TRIG.SLOPE | + |
| STARTS AFTER DELAY | (PUSH) |

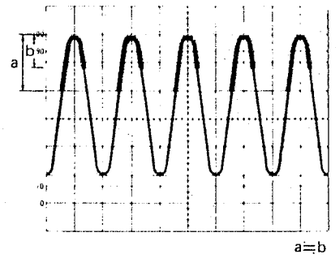
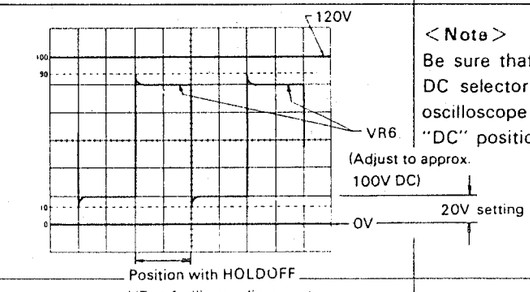
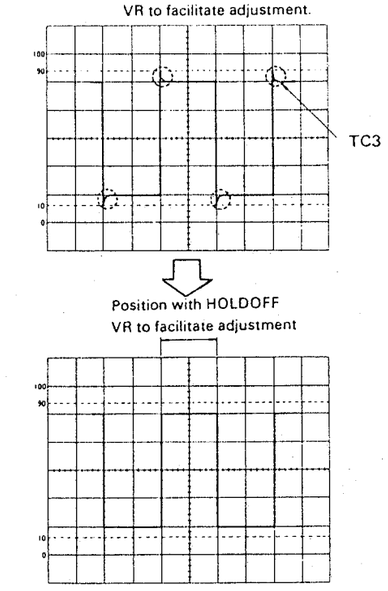
**Mode Section**

| | |
|---|---|
| V. MODE | CH1 |
| 20MHz BW | OFF |
| CH2 INV | OFF |
| TRIG. MODE | AUTO |
| HORIZONTAL DISPLAY | A |

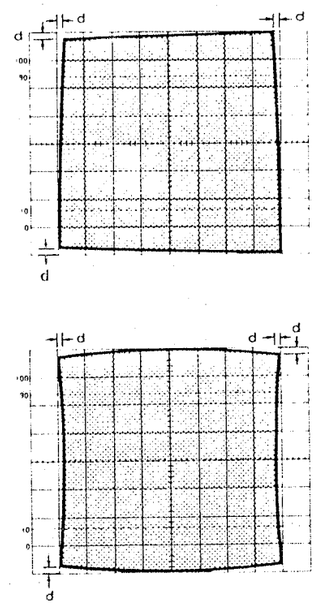
# ADJUSTMENT

<table>
<tr><th>Item</th><th>Adjustment Control</th><th>P.C.B No.</th><th>Test Equipment</th><th>Control Setting</th><th>Adjustment and Check</th><th>Illustration</th><th>Remark</th></tr>
<tr><td colspan="8">ADJUSTMENT OF POWER SUPPLY AND CRT</td></tr>
<tr><td>Checking of Power Supply</td><td></td><td>X68-1310</td><td>475A<br>DL-720</td><td></td><td>(1) Measurement and checking of voltages at P27 and P30 pins
<table>
<tr><td></td><td>1P</td><td>2P</td><td>3P</td><td>4P</td><td>5P</td><td>6P</td><td>7P</td><td>8P</td></tr>
<tr><td>P27</td><td>+120V</td><td>+55±1V</td><td>20V</td><td></td><td></td><td>5.2V</td><td>10V</td><td>−10V</td></tr>
<tr><td>P30</td><td>24V±2V</td><td>55V</td><td>+130V<br>±3V</td><td></td><td>7V±0.5V</td><td>12V<br>+1.5V−0.5V</td><td>−12V<br>+0.5V−1.5V</td><td></td></tr>
</table></td><td></td><td></td></tr>
<tr><td>Adjustment of 1.7kV</td><td>VR7</td><td>X68-1310</td><td>DL-720<br>High voltage probe</td><td></td><td>(2) Measure the voltage on 2P of P33 and adjust VR7 to obtain 1.75 kV (1.75kV～1.755 kV).</td><td></td><td></td></tr>
<tr><td>Coarse adjustment of ASTIG and FOCUS</td><td>VR9<br>FOCUS Knob</td><td>X68-1310</td><td></td><td>H. DISPLAY: X-Y<br>CH1, CH2 AC-GND-DC: GND<br>A INTENSITY: 3 o'clock<br>20MHz BW: ON</td><td>(1) Operate ▲▼ POSITION knobs for CH1 and CH2 to position the spot in the center of the CRT screen.<br>(2) Adjust VR9 to make the spot round and smaller.</td><td></td><td></td></tr>
<tr><td>Adjustment of A INTENSITY</td><td>VR5</td><td>X68-1310</td><td></td><td>H.DISPLAY: X-Y<br>A. INTENSITY: 9 o'clock<br>CH1, CH2 AC-GND-DC: GND<br>20MHz BW: ON</td><td>Adjust VR5 so that the spot on the CRT screen disappears when A INTENSITY is set in the position of 9 o'clock.<br>＜Check＞<br>(1) Make sure that the spot on the CRT screen increases in brightness when A INTENSITY is turned CW and that the trace becomes almost extinguished when A INTENSITY is turned CCW (9 o'clock position).</td><td></td><td></td></tr>
<tr><td>Checking of B INTENSITY</td><td></td><td></td><td></td><td>H. DISPLAY: ALT<br>V. MODE: CH1<br>TRIG. MODE: AUTO<br>STARTS AFTER DELAY: PULL<br>CH1, AC-GND-DC: AC<br>B SWEEP TIME/DIV: 0.1ms</td><td>(1) Operate ▲▼ TRACE SEP to cause B sweep line in the center of the CRT screen.<br>(2) Make adjust so that the trace becomes extinguished when B INTENSITY is turned to fully CCW.<br>when B INTENSITY is turned CCW.<br>(3) Make adjust so that the trace becomes extinguished when B INTENSITY is turned to fully CCW.</td><td></td><td></td></tr>
<tr><td>Adjustment of Blanking</td><td>TC2</td><td>X68-1310</td><td>SG-502</td><td>H.DISPLAY: A<br>V.MODE: CH1<br>TRIG. MODE: AUTO<br>A TRIG SOURCE: V.MODE<br>A COUPLING: AC<br>A INTENSITY: Fully CW<br>CH1. AC-GND-DC: AC<br>A SWEEP TIME/DIV: 0.02μs</td><td>(1) Apply a sine wave signal of 10 MHz to CH1 INPUT and operate ▲▼ POSITION, ◀▶ POSITION and CH1 VOLTS/DIV to bring out a waveform with a vertical amplitude of 6 div on the screen.<br>(2) Make adjustment so that there is no unevenness in intensity of the trace at the waveform starting point and there is no retrace.</td><td> 
</td><td></td></tr>
<tr><td>Adjustment of Z-axis Input Blanking</td><td>TC1</td><td>X68-1310</td><td>SG-503</td><td>H. DISPLAY: A<br>V. MODE: CH1 :<br>TRIG. MODE: AUTO<br>A. TRIG; SOURCE: V. MODE<br>CH1 AC-GND-DC: DC<br>VOLTS/DIV: 2V</td><td>(1) Set A SWEEP TIME/DIV at 5 μs and apply a 1MHz sine wave signal of 10Vp-p to CH1 INPUT so that a waveform with a vertical amplitude of 5 div appears on the screen.<br>(2) Apply the same signal above to the Z INPUT, and turn A INTENSITY CCW so that the dark and bright area of the waveform are distinct.<br>(3) Adjust so that the bright area of the sine waveform is symmetrical to the peak point.</td><td></td><td></td></tr>
</table>

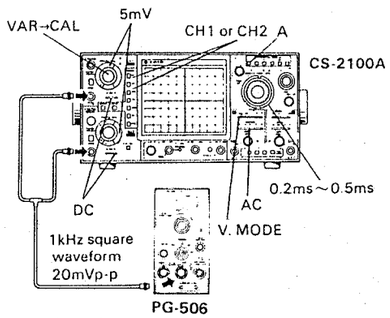
# ADJUSTMENT

| Item | Adjustment Control | P.C.B No. | Test Equipment | Control Setting | Adjustment and Check | Illustration | Remark |
|---|---|---|---|---|---|---|---|
| | | | | | |  | |
| **Adjustment of Auto FOCUS Level** | VR6 | X68-1310 | 475A Probe (1/10) | H. DISPLAY: A<br>A. INTENSITY: Fully CW<br>TRIG. MODE: AUTO<br>V. MODE: CH1:<br>A. TRIG SOURCE: V. MODE<br>A. SWEEP TIME/DIV: 20μs<br>HOLDOFF: NORM | (1) Set the oscilloscope (475A) for the vertical axis sensitivity at 2V/div.<br>(2) Observe the waveform of AUTO FOCUS circuit (Autofocus test point FTP marked pattern) with a probe and make adjustment so that DC level of top of the square wave is approx. 100V (4.5～5 div.) |  | <Note><br>Be sure that the AC-GND-DC selector switch of the oscilloscope (475A) is at "DC" position. |
| **Adjustment of Auto FOCUS wave Forming** | TC3 | X68-1310 | | H. DISPLAY: A<br>A INTENSITY: Fully CW<br>TRIG MODE: AUTO<br>V. MODE: CH1<br>A. TRIG SOURCE: V.MODE<br>A SWEEP TIME/DIV: 20μs<br>HOLD OFF: NORM | Make adjustment so that the above-mentioned circuit has an ideal waveform. |  | |
| **Adjustment of ASTIG and FOCUS** | VR9<br>FOCUS knob | X68-1310 | | H. DISPLAY: X-Y<br>CH1, CH2 AC-GND-DC: GND<br>A. INTENSITY: 3 o'clock | (1) Operate ↕ POSITION for CH1 and CH2 so that the bright spot is brought into the center cf the CRT screen.<br>(2) Make adjustment to make the spot round and smaller.<br><Check><br>(1) Make sure that the bright spot grows larger when the FOCUS knob is turned CW or CCW.<br>(2) Make sure that the FOCUS knob is in a position within the range of 9 and 3 o'clock when the spot is smallest.<br>(3) The most ideal point should be obtained by repeating the above operations and adjustment. | | <Note><br>Be sure to bring the bright spot into the center of the CRT screen. It may be difficult to obtain the correct adjusting position near the edge of the screen due to the CRT peripheral blur. |

# ADJUSTMENT

| Item | Adjustment Control | P.C.B No. | Test Equipment | Control Setting | Adjustment and Check | Illustration | Remark |
|---|---|---|---|---|---|---|---|
| **Adjustment of Trace Rotation** | VR2 | X68-1310 | | H.DISPLAY: A<br>V. MODE: CH1<br>TRIG. MODE: AUTO<br>CH1, AC-GND-DC; GND | (1) Operate ▲▼ POSITION for CH1 to move the trace to the center of the CRT screen.<br>(2) Make adjustment to align the trace with the horizontal center graticule line.<br>**< Check >**<br>(1) Make sure that the trace moves more than 0.5 div (10°) up and down from the horizontal center graticule line at its righthand end. | | **< Note >**<br>When the trace does not appear fully across the screen, make proper adjustment by operating VR9 (X74-1320) and VR7 (X74-1320) |
| **Adjustment of Perpendicularity** | VR3 | X68-1310 | SG-502 | H. DISPLAY: X-Y<br>CH1, CH2 AC-GND-DC: AC | (1) Apply a 1 kHz sine wave to CH1 INPUT and adjust the oscillator (SG-502) output to produce a waveform with a vertical amplitude of 8 div.<br>(2) Operate ▲▼ POSITION knobs for CH1 and CH2 to produce a trace in the center of the CRT screen.<br>(3) Make adjustment so that the trace is vertical (within 90° ±1°)<br>**< Check >**<br>Make sure that the trace moves more than 0.1 div left and right at the topmost end of the vertical center graticule line.<br>Readjust the trace rotation. | | |
| **Adjustment of Pattern Distortion** | VR10 | X68-1310 | SG-502 | H.DISPLAY: X-Y<br>CH1, CH2 AC-GND-DC: AC | (1) Apply a sine wave signal of 100 kHz to CH1 INPUT and a sine wave signal of 1 kHz to CH2 INPUT and adjust the oscillator output to produce a square with the sides of 8 div on the CRT screen.<br>(2) Adjust VR10 so that the horizontal and vertical bendings are less than 0.2 div. |  <br>d= 0.2div. or less | |

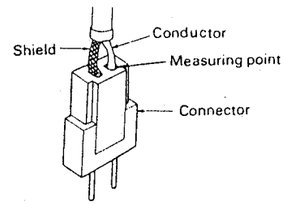
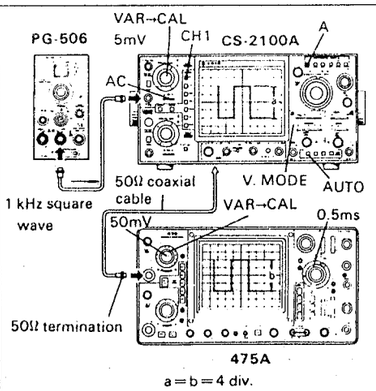
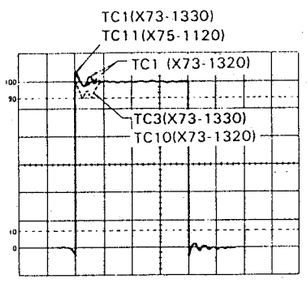
# ADJUSTMENT

| Item | Adjustment Control | P.C.B No. | Test Equipment | Control Setting | Adjustment and Check | Illustration | Remark |
|---|---|---|---|---|---|---|---|
| Adjustment of CRT Center | VR1 | X73-1330 | | H. DISPLAY: A<br>V. MODE: CH1<br>TRIG. MODE: AUTO<br>CH1. AC-GND-DC: GND | Short-circuit the test point of X73-1320 and adjust VR1 so that the trace becomes aligned with the horizontal center graticule line. | | |
| ADJUSTMENT OF VERTICAL AXIS (I) | | | | | | | |
| Adjustment of CH1 DC BAL | VR1 | X75-1120 | | H. DISPLAY: A<br>V. MODE: CH1<br>TRIG. MODE: AUTO<br>CH1. AC-GND-DC: GND<br>CH1. VOLTS/DIV: 5mV | (1) Turn CH1 VARIABLE knob to fully CCW.<br>(2) Adjust CH1 ▲▼ POSITION so that the trace becomes aligned with the horizontal center graticule line on the CRT screen.<br>(3) Turn VARIABLE to CAL and make adjustment so that the trace becomes aligned with the horizontal center graticule line on the CRT screen.<br>(4) Repeat the above procedure.<br>＜Check＞<br>Movement of trace \| Less than 0.2 div. | | ＜Note＞.<br>If the trace does not come to the center of the screen even when ▲▼ POSITION is operated, adjust VR4 (X73-1320). |
| Adjustment of CH2 DC BAL | VR2 | X75-1120 | | H. DISPLAY: A<br>V. MODE: CH2<br>TRIG. MODE: AUTO<br>CH2, AC-GND-DC: GND<br>CH2, VOLTS/DIV: 5 mV | Same with the adjustment of CH1 DC BAL | | ＜Note＞<br>CH2 position center can be adjusted by VR14 (X73-1-320). |
| Adjustment of CH1 Gain | VR3 | X73-1320 | BNC-BNC cord<br>T junction<br>PG-506 | H. DISPLAY: A<br>V. MODE: CH1<br>TRIG. MODE: AUTO<br>A. TRIG SOURCE: V.MODE<br>CH1, AC-GND-DC: DC<br>CH1, VOLTS/DIV: 5mV<br>V. VAR: CAL<br>PUSH 50Ω: OFF<br>20 MHz BW: ON | (1) Apply a square wave signal of 20 mVp-p, 1 kHz to CH1 and CH2 INPUT.<br>(2) V. MODE select to CH1 and operate CH1 and CH2 ▲▼ POSITION to produce a waveform in the center of the CRT screen.<br>(3) Synchronize by operating A TRIG LEVEL.<br>(4) Adjust VR3 so that the vertical amplitude of the waveform becomes 4 div.<br>＜Check＞<br>Turn CH1 VOLTS/DIV and input a reference signal so that the vertical amplitude will be 4 to 6 div in each range.<br>Sensitivity error \| within ±3% |  | ＜Refrence＞<br>Method of calculation of sensitivity error<br>Sensitivity error = $\frac{a-b}{b}$ × 100%<br>a = CRT screen amplitude<br>b = Input signal voltage /(VOLTS/DIV)<br>(Example):<br>CRT screen amplitude: 4.2 div<br>Input signal: 20mVp-p<br>1 kHz square wave<br>VOLTS/DIV: 5mV<br>Sensitivity error<br>= $\frac{4.2 \text{ div} - 20\text{mV}/5\text{mV}}{20\text{mV}/5\text{mV}}$<br>× 100 = 5% |
| Adjustment of CH2 Gain | VR13 | X73-1320 | | H. DISPLAY: A<br>V. MODE: CH2<br>TRIG MODE: AUTO<br>A TRIG SOURCE: V.MODE<br>CH2 AC-GND-DC: DC<br>CH2 VOLTS/DIV: 5mV<br>V. VAR: CAL<br>PUSH 50Ω: OFF<br>20 MHz BW: ON | (1) With V. MODE selected to CH2, turn VOLTS/DIV to 5mV and perform the same operations as described above to make adjustment and check.<br>＜Check＞<br>(1) Select V. MODE to DUAL and ALT position and turn VOLTS/DIV for CH1 and CH2 and apply a square wave of 20mVp-p, 1 kHz to CH1 INPUT. Make sure that CH1 and CH2 have the same amplitude. | | ＜Note＞<br>Overshoot or tilt might appear to the reference signal of 1 kHz square wave. In this case, make corase adjustment of square wave characteristics. |

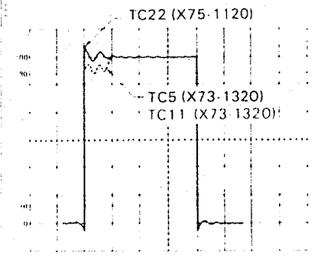
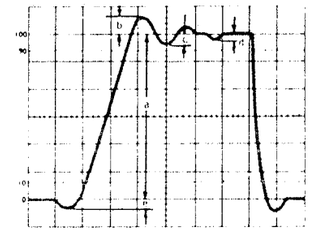
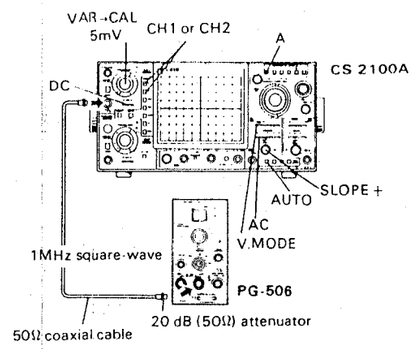
# ADJUSTMENT

| Item | Adjustment Control | P.C.B No. | Test Equipment | Control Setting | Adjustment and Check | Illustration | Remark |
|---|---|---|---|---|---|---|---|
| | | | | | (2) Switch V. MODE to ADD and A. TRIG SOURCE to CH1 (CH2) and press CH2 INV pushbutton switch (the lamp will go on when this switch is pressed and it will go off when pressed again). Operate ⇕ POSITION for CH1 and CH2 to produce a single trace in the center of the CRT screen. If a single and straight trace cannot be obtained, adjust VR3 again.<br>Channel error: Within 3% | | |
| **Adjustment of CH1 ⇕ POSITION and CH2 ⇕ POSITION** | VR4<br>VR14 | X73-1320<br>X73-1320 | | V. MODE: DUAL, ALT<br>H.DISPLAY: A<br>TRIG.MODE: AUTO<br>CH1, CH2 VOLTS/DIV: 5mV<br>CH1, CH2 AC-GND-DC:GND<br>CH1, CH2 ⇕ POSITION: 12 o'clock<br>A SWEEP TIME/DIV: 0.1ms | Adjust VR4 and VR14 so that the CH1 and CH2 traces become aligned with the horizontal center graticule line on the CRT screen.<br>**<Check>**<br>(1) The deviation from the horizontal center graticule line on the CRT screen must be within ±1 div.<br>(2) When ⇕ POSITION for both CH1 and CH2 is turned fully CW, the trace must move upward more than 4 div and when the knob is turned fully CCW the trace must move downward more than 4 div. | | |
| **Adjustment of CH2 INV Position** | VR15 | X73-1320 | | | Press CH2 INV (the lamp is on) and adjust VR15 to bring the trace to its position at CH2 NORM (the lamp is off).<br>**<Check>**<br>(1) Vertical deviation between CH2 NORM and INV : within ±0.5 div<br>(2) Press CH2 INV and turn CH2 ⇕ POSITION fully CW and see if the trace moves more than 4 div upward and it moves more than 4 div downward when the knob is turned fully CCW. | | |
| **Adjustment of CH1 X5 Gain and CH2 X5 Gain** | VR6<br>VR17 | X73-1320<br>X73-1320 | PG-506 | H. DISPLAY: A<br>V. MODE: DUAL, ALT<br>TRIG.MODE: AUTO<br>CH1,CH2 VOLTS/DIV:5mV<br>CH1, CH2 AC-GND-DC: DC<br>CH1,CH2 X5 GAIN: PULL<br>A SWEEP TIME/DIV: 0.2ms<br>V.VAR: CAL<br>CH1,CH2 PUSH 50Ω: OFF | (1) Apply a square wave signal of 5 mVp-p to CH1 INPUT and make adjustment so that the CRT screen amplitude becomes 5 div.<br>(2) Apply the same signal to CH2 and make the similar adjustment.<br>**<Check>**<br>(1) The sensitivity error must be within ±3%.<br>(2) For both CH1 and CH2, the lamp must go on when PULL X5 GAIN is pulled and go off when the button is pressed.<br>(3) The UNCAL lamp must go off when VARIABLE is operated to CAL and go on when the knob is turned to UNCAL. (CCW) | | **<Note>**<br>If no waveform appears on the screen when the knob is pulled, make coarse adjustment by operating X5 Gain Position Adjustment.<br>CH1: VR5 (X73 1320)<br>CH2: VR16 (X73-1320) |
| **Adjustment of CH1 X 5 Gain Position andCH2 X 5 Gain Position** | VR5<br>VR16 | X73-1320<br>X73-1320 | | H. DISPLAY: A<br>V. MODE: DUAL, ALT<br>TRIG. MODE: AUTO<br>CH1,CH2 VOLTS/DIV:5mV<br>CH1,CH2 AC-GND-DC:GND<br>CH1,CH2 X5 GAIN: PULL<br>CH1,CH2 ⇕ POSITION: 12 o'clock<br>A SWEEP TIME/DIV: 0.1ms | Adjust VR5 and VR16 so that the trace of CH1 and CH2 become aligned with the horizontal center graticule line on the CRT screen.<br>**<Check>**<br>The distance from the center graticule line must be within ±1 div. | | **<Note>**<br>If sometimes happens tha the trace grows thicker a X5 GAIN, thus making i difficult to obtain prope adjustment. In this case press 20 MHz BW (th lamp is on) button switch t make the line thinner. |

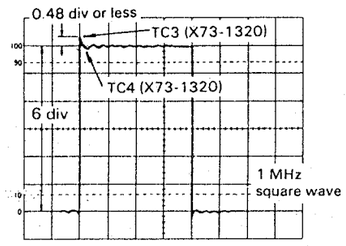
# ADJUSTMENT

<table>
<tr><th>Item</th><th>Adjustment Control</th><th>P.C.B No.</th><th>Test Equipment</th><th>Control Setting</th><th>Adjustment and Check</th><th>Illustration</th><th>Remark</th></tr>
<tr><td>Adjustment of<br>CH1 DC Trig Level<br>CH2 DC Trig Level<br>CH3 DC Trig Level<br>CH4 DC Trig Level</td><td><br>VR7<br>VR19<br>VR10<br>VR20</td><td><br>X73-1320<br>X73-1320<br>X73-1320<br>X73-1320</td><td>DL-720</td><td>H. DISPLAY: A<br>V. MODE: QUAD<br>CH1, CH2 AC-GND-DC: GND<br>TRIG. MODE: AUTO</td><td>(1) Operate CH1 ▲▼ POSITION and CH3 and CH4 ▲▼ POSITION to align the trace with each other on the center of the CRT screen.<br>(2) Make adjustment so that the voltage at all the check points may be zero (−0.008～ +0.008V).<br><table><tr><th>Item of Adj.</th><th>Adj. Control</th><th>Check point</th></tr><tr><td>CH1 DC Trig Level</td><td>VR7</td><td>P15 (X73-1320)</td></tr><tr><td>CH2 DC Trig Level</td><td>VR19</td><td>P16 (X73-1320)</td></tr><tr><td>CH3 DC Trig Level</td><td>VR10</td><td>P17 (X73-1320)</td></tr><tr><td>CH4 DC Trig Level</td><td>VR20</td><td>P18 (X73-1320)</td></tr></table></td><td>  </td><td>＜Note＞<br>Use the connector lead for making measurement at the check points.<br>Adjust the voltage in the conductor to zero.</td></tr>
<tr><td>Adjustment of<br>V. MODE Trig DC Level</td><td>VR22</td><td>X73-1320</td><td></td><td>V. MODE: CH1<br>CH1, AC-GND-DC: GND</td><td>(1) Operate CH1 ▲▼ POSITION to align the trace with horizontal center graticule line on the CRT screen.<br>(2) Make adjustment so that the voltage in the conductor of the connector P19 is zero (−0.008 ～ +0.008V).</td><td></td><td></td></tr>
<tr><td>Adjustment of CH1<br>OUT Gain</td><td>VR8</td><td>X73-1320</td><td>475A<br>50Ω Termination<br>50Ω coaxial cable<br>PG-506</td><td>H.DISPLAY: A<br>V. MODE: CH1<br>TRIG MODE: AUTO<br>CH1 AC-GND-DC: AC<br>CH1 VOLTS/DIV: 5mV<br>V. VAR: CAL</td><td>(1) Set the vertical axis sensitivity of oscilloscope (475A) to 50mV and AC-GND-DC to DC.<br>(2) Connect the cable to CH1 OUT on the rear panel of CS-2100 and oscilloscope (475A) via the 50Ω termination.<br>(3) Apply a 1 kHz square wave signal to CH1 INPUT and adjust the oscillator output and ▲▼ POSITION so that the amplitude may be 2 div upward and downward from the horizontal center graticule line on the CRT screen.<br>(4) Make adjustment so that the oscilloscope (475A) waveform becomes 4 div.</td><td>  <br>a=b=4 div.</td><td></td></tr>
<tr><td>Adjustment of<br>CH1 OUT DC Level</td><td>VR9</td><td>X73-1320</td><td>DL-720</td><td>H.DISPLAY: A<br>V. MODE: CH1<br>CH1 AC-GND-DC: GND<br>TRIG. MODE: AUTO</td><td>(1) Operate CH1 ▲▼ POSITION to align the trace with the horizontal center graticule line on the CRT screen.<br>(2) Make adjustment so that the voltage in the connector P21 (X73−1320) becomes less than 0V (±10mV).</td><td></td><td></td></tr>
<tr><td>Adjustment of<br>Square wave Charactaristics<br>of CH1 5mV and 0.5V<br>Ranges</td><td>TC3<br>TC1<br>TC10<br>TC11<br>TC1<br>TC9<br>TC7<br>TC23</td><td>X73-1330<br>X73-1320<br>X73-1320<br>X75-1120<br>X73-1330<br>X73-1320<br>X75-1120<br>X75-1120</td><td>PG-506<br>50Ω 20dB Attenuator<br>50Ω coaxial cable<br>(BNC-BNC)</td><td>H. DISPLAY: A<br>TRIG MODE: AUTO<br>CH1, AC-GND-DC: DC<br>CH1, VOLTS/DIV: 5mV<br>A TRIG SOURCE: CH1<br>COUPLING: AC<br>A TRIG SLOPE : +<br>V VAR: CAL<br>PUSH 50Ω: ON</td><td>(1) Set V. MODE to CH1 and repeatedly apply a 1 MHz squarewave signal to CH1 INPUT from the squarewave oscillator and adjust the oscillator output so that the amplitude becomes 6 div. In doing this, the input terminal must be terminated to match the output impedance of the oscillator. When the output impedance is 50Ω termination or depress the PUSH 50Ω button.<br>(2) Adjust TC3, TC1, TC10, TC11 and TC1 to shape the square wave on the CRT screen (CS-2100A) as illustrated at right.<br>(3) Rotate VOLTS/DIV to 0.5V and adjust TC7, TC23 so that the quality of square waveform becomes the best.</td><td>  </td><td>(1) Adjust A SWEEP TIME/DIV between 0.02 μs and 0.2 μs so that the waveform is visible.<br>(2) As all measuring instruments are affected, repeat the adjustment individually.</td></tr>
</table>

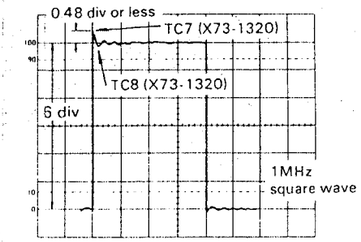
# ADJUSTMENT

| Item | Adjustment Control | P.C.B No. | Test Equipment | Control Setting | Adjustment and Check | Illustration | Remark |
|---|---|---|---|---|---|---|---|
| **Adjustment of Square wave Characteristics of CH2 5mV and 0.5V Ranges** | TC5<br>TC22<br>TC11<br>TC18<br>TC24 | X73-1320<br>X75-1120<br>X73-1320<br>X75-1120<br>X75-1120 | PG-506<br>50Ω, 20dB Attenuator 50Ω coaxial cable (BNC-BNC) | H. DISPLAY: A<br>TRIG MODE: AUTO<br>CH2, AC-GND-DC: DC<br>CH2, VOLTS/DIV: 5mV<br>A TRIG SOURCE: CH2<br>COUPLING: AC<br>A TRIG SLOPE: +<br>V. VAR: CAL<br>PUSH 50Ω: ON | (1) Set V. MODE to CH2 and make adjustment to obtain the same waveform as in the case of CH1.<br>(2) Rotate the VOLTS/DIN to 0.5V and adjust TC18 and TC24 to obtain the same waveform as in the case of CH1<br>**< Check >**<br>(1) With VOLTS/DIV remaining at 5mV, check the waveform quality when A. SWEEP TIME/DIV is changed by varying the squarewave frequency, from 100kHz to 10kHz, 1kHz and back to 100Hz sequentially.<br>Overshoot \| Less than 8% |  <br>  <br>a = 6 div c = Ringing e = Pre-shoot<br>b = Overshoot d = Hall | |
| **Adjustment of Square wave Characteristics of CH1 X5 GAIN** | TC2 | X73-1320 | PG-506<br>50Ω, 20dB Attenuator 50Ω coaxial cable (BNC-BNC) | H. DISPLAY: A<br>TRIG MODE: AUTO<br>CH1, AC-GND-DC: DC<br>CH1, VOLTS/DIV: 5mV<br>A TRIG SOURCE: CH1<br>COUPLING: AC<br>A TRIG SLOPE: +<br>V. VAR: CAL<br>PUSH 50Ω: ON | (1) With V. MODE being set to CH1, pull the PULL X5 GAIN and apply 1 MHz squarewave signal to CH1 INPUT to produce a waveform quality of 6 div on the CRT screen.<br>(2) Make adjustment to improve the waveform quality<br>**< Check >**<br>Overshoot \| less than 8%. |  | **< Note >**<br>Terminate the input terminal of oscilloscope to match the output impedance of the oscillator. |
| **Adjustment of Square wave Characteristics of CH2 X5 GAIN** | TC6 | X73-1320 | | A TRIG SOURCE: CH2<br>Same as CH1 setting | (1) With V. MODE set to CH2, apply 1 MHz square wave signal to CH2 INPUT and make the same adjustment as in the case of CH1.<br>**< Check >**<br>Overshoot \| less than 8%. | | |

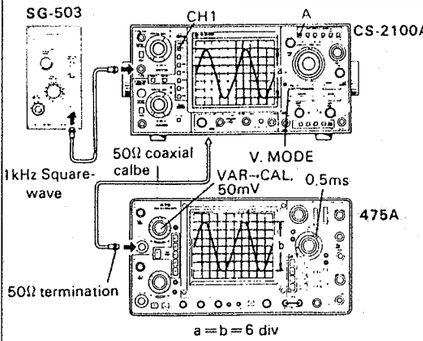
# ADJUSTMENT

<table>
<tr><th>Item</th><th>Adjustment Control</th><th>P.C.B No.</th><th>Test Equipment</th><th>Control Setting</th><th>Adjustment and Check</th><th>Illustration</th><th>Remark</th></tr>
<tr><td>Adjustment of<br>CH1 ATT<br>CH2 ATT</td><td></td><td>X75-1120</td><td>4343B<br>PG-506</td><td>H.DISPLAY: A<br>CH1 AC-GND-DC: DC<br>A TRIG SOURCE: V. MODE<br>A SWEEP TIME/DIV: 0.2ms<br>V.VAR: CAL</td><td>(1) Shaping of waveform<br>Apply 1 kHz squarewave signal to CH1 and CH2 INPUT and adjust the oscillator output to produce a waveform of 5～6 div. In doing this, make adjustment so that the waveform quality of each range is equal to that of the 5mV range.<br>(2) Input capacity (28 pF±2 pF)<br>Connect a Q-meter (4343B) to CH1 and CH2 INPUT and make adjustment so that the input capacity of each range is equal to that of the 5mV range.<br><br>CH1 Reference range: 5mV Range<br><table><tr><th>Sequence</th><th colspan="2">Adjustment</th><th>Adj. control</th></tr><tr><td>1</td><td>10mV range</td><td>Wave Shape</td><td>TC4</td></tr><tr><td>2</td><td>20mV range</td><td>Wave Shape</td><td>TC5</td></tr><tr><td>3</td><td>50mV range</td><td>Wave Shape</td><td>TC6</td></tr><tr><td>4</td><td>0.5V range</td><td>Wave Shape</td><td>TC10</td></tr><tr><td>5</td><td>10mV range</td><td>Input Capacity</td><td>TC1</td></tr><tr><td>6</td><td>20mV range</td><td>Input Capacity</td><td>TC2</td></tr><tr><td>7</td><td>50mV range</td><td>Input Capacity</td><td>TC3</td></tr><tr><td>8</td><td>0.5V range</td><td>Input Capacity</td><td>TC8</td></tr></table><br>CH2 Reference range: 5mV Range<br><table><tr><th>Sequence</th><th colspan="2">Adjustment</th><th>Adj. control</th></tr><tr><td>1</td><td>10mV range</td><td>Wave Shape</td><td>TC15</td></tr><tr><td>2</td><td>20mV range</td><td>Wave Shape</td><td>TC16</td></tr><tr><td>3</td><td>50mV range</td><td>Wave Shape</td><td>TC17</td></tr><tr><td>4</td><td>0.5V range</td><td>Wave Shape</td><td>TC21</td></tr><tr><td>5</td><td>10mV range</td><td>Input Capacity</td><td>TC12</td></tr><tr><td>6</td><td>20mV range</td><td>Input Capcity</td><td>TC13</td></tr><tr><td>7</td><td>50mV range</td><td>Input Capacity</td><td>TC14</td></tr><tr><td>8</td><td>0.5V range</td><td>Input Capacity</td><td>TC19</td></tr></table></td><td></td><td>＜Note＞<br>(1) Be sure to make the adjustment with the shield case being fitted in place.<br>(2) If smearing or overshoot occurs to the square wave at 0.1V or 0.2V range, at 0.1V range, adjust TC1 (CH1) or TC12 (CH2) and at 0.2V range, TC2 (CH1 or TC13 (CH2)<br>*Input capacity should be in the specification.</td></tr>
<tr><td colspan="8">ADJUSTMENT OF A, B TRIG AMPLIFIERS</td></tr>
<tr><td>Adjustment of<br>CH3 Gain and<br>CH4 Gain</td><td>VR11<br>VR21</td><td>X73-1320<br>X73-1320</td><td>PG506</td><td>H.DISPLAY: A<br>V.MODE: QUAD. ALT<br>A TRIG SOURCE: 1/1<br>B TRIG SOURCE: 1/1<br>A SWEEP TIME/DIV: 0.2ms<br>TRIG MODE: AUTO<br>CH1, CH2 AC-GND-DC: GND</td><td>(1) Apply a 1 kHz squarewave signal simultaneously to CH3 and CH4 INPUT and adjust A TRIG LEVEL and B TRIG LEVEL to obtain synchronization. Operate CH3 and CH4 POSITION to bring the pattern to the center of the CRT screen.<br>(2) Make adjustment so that the amplitude of CH3 and CH4 becomes 5 div., respectively.<br><br>＜Check＞<br>(1) Sensitivity error must be within ±3%. (See to Reference for the adjustment of CH1 Gain)<br>(2) With A. TRIG SOURSE and B. TRIG SOURSE set to 1/10, make the 1 kHz squarewave signal 5 Vp-p and operate CH3 and CH4 POSITION to bring the waveform to the center of the CRT screen.<br>The amplitude at this time must be within the range of 4.85～5.15 div.<br><table><tr><td>Sensitivity error</td><td>within ±3%.</td></tr></table></td><td></td><td>＜Note＞<br>If tilt or overshoot occurs to the 1 kHz waveform, refer to the section devoted to CH3 and CH4 waveform shaping.</td></tr>
<tr><td>CH3 Waveform Shaping</td><td>TC3<br>(A SOURCE 1/10)<br>TC4(Medium range)<br>TC3(Ultra high range)</td><td>X77-1130<br><br>X73-1320<br><br>X73-1320</td><td>PG-506</td><td>H.DISPLAY: A<br>V. MODE: QUAD, ALT<br>A TRIG SOURCE: 1/1<br>A SWEEP TIME/DIV: 0.2ms<br>TRIG MODE: AUTO<br>CH1, CH2 AC-GND-DC: GND</td><td>(1) Apply a 1 kHz square wave signal of fast rise time to CH3 INPUT and adjust the oscillator output to produce a waveform of 6 div on the CRT screen.<br>(2) With A. SOURSE set to 1/10, produce a waveform of 6 div in the same manner and adjust TC3 to obtain the similar waveform as (1) above.<br>(3) With A. SOURSE to 1/1 adjust the oscillator output and frequency to produce a square waveform of 1 MHz 6 div on the CRT screen and shape the waveform in the medium and ultra-high ranges.<br><br>＜Check＞<br><table><tr><td>Overshoot</td><td>less than 8%.</td></tr></table></td><td>  </td><td>＜Note＞<br>(1) When shaping the waveform, terminate the output terminal of oscilloscope to match the impedance of the oscillator.<br>(2) Before making 1 MHz wave shape, be sure to adjust input capacity (1/1 and 1/10) (TC1 and TC2)</td></tr>
</table>

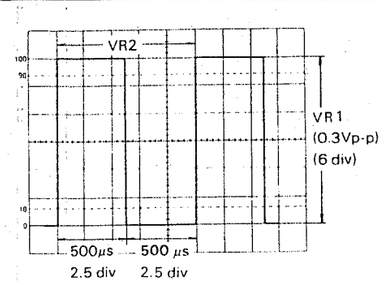
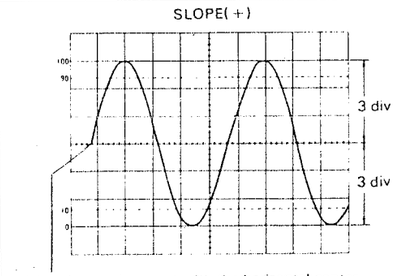
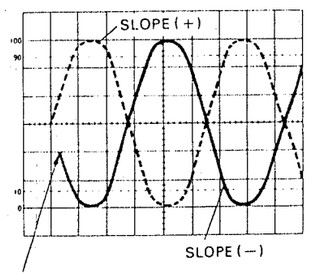
# ADJUSTMENT

| Item | Adjustment Control | P.C.B No. | Test Equipment | Control Setting | Adjustment and Check | Illustration | Remark |
|---|---|---|---|---|---|---|---|
| CH4 Wave form Shapping | TC6 (B SOURCE 1/10)<br>TC8(Medium range)<br>TC7(Ultra high range) | X77-1130<br>X73-1320<br>X73-1320 | PG-506 | H.DISPLAY: DUAL<br>V.MODE: QUAD.ALT<br>A TRIG SOURCE: 1/1<br>B TRIG SOURCE: 1/1<br>A SWEEP TIME/DIV: 0.2ms<br>B SWEEP TIME/DIV: 0.2ms | (1) Apply a 1kHz and 1 MHz square wave signals of fast rise time to CH4 INPUT and take the same steps as in (1) above to shape the waveform.<br>< Check ><br>Overshoot \| less than 8%. |  | < Note ><br>(1) Before making 1 MHz wave shape, be sure to adjust input capacity (1/1 and 1/10) (TC4 and TC5) |
| Adjustment of CH3 Input Capacity | TC1(1/1)<br>TC2(1/10) | X77-1130<br>X77-1130 | 4343B | A TRIG SOURCE: 1/1<br>B TRIG SOURCE: 1/1 | (1) Make adjustment so that the input capacity of CH3 becomes equal to the value of CH1 5mV range (28±2pF).<br>(2) Adjust the input capacity to become equal to that at 1/1.<br>< Check ><br>The difference between A SOURCE 1/1 and A SOURCE 1/10 less than 1pF.<br>It shall be the same with B SOURCE. | | < Note ><br>Be sure to make adjustment of input capacity after making 1 kHz square wave waveshape. |
| Adjustment of CH4 Input Capacity | TC4 (1/1)<br>TC5 (1/10) | X77-1130<br>X77-1130 | | | Adjust the input capacity in the same manner as CH3.<br>< Check ><br>Check the input capacity in the same manner as CH3.<br>Overshoot \| less than 8%. | | < Note ><br>Be sure to make adjustment of input capacity after making 1 kHz square wave waveshape. |
| ADJUSTMENT OF VERTICAL AXIS (II) | | | | | | | |
| Check of 1 MHz Square wave Characteristics<br>Square wave Characteristics of CH1 and CH2 | | | PG-506 | H.DISPLAY: A<br>A. TRIG SOURCE: V.MODE<br>A.SWEEP TIME/DIV: 0.2μs～0.02μs<br>TRIG.MODE: AUTO<br>A COUPLING: AC<br>PUSH 50Ω: ON | (1) Check the squarewave characteristics of CH1 and CH2 5mV range. Turn the VOLTS/DIV knob for each channel to adjust the oscillator output so that CH1 and CH2 will produce a waveform of 6 div, respectively.<br>(2) The overshoot must be less than 8% for each range. | | < Note ><br>As the VOLTS/DIV is manually rotated, the amplitude of 6 divs cannot be obtained amplitude. |
| Square wave Characteristics of CH3 and CH4 | | | 50Ω Termination | H. DISPLAY: DUAL<br>V. MODE: QUAD. ALT<br>A.TRIG SOURCE: 1/1<br>B.TRIG SOURCE: 1/1 | (1) Apply a 1 MHz squarewave signal to CH3 and CH4 INPUT and see if the overshoot is less than 8% at this time.<br>(2) The overshoot must be less than 8% when A TRIG SOURCE is turned from 1/1 to 1/10 and B TRIG SOURCE from 1/1 to 1/10. | | |
| CHeck of CH1 and CH2 Frequency Characteristics | | | SG-503<br>50Ω coaxial cable (BNC-BNC)<br>50Ω 20dB attenuator | H. DISPLAY: A<br>TRIG MODE: AUTO<br>A. TRIG SOURCE: V. MODE<br>A COUPLING: AC<br>CH1, CH2 AC-GND-DC: DC<br>A SWEEP TIME/DIV: 2μs～0.02μs<br>PUSH 50Ω: ON | (1) With CH1 VOLTS/DIV set to 5 mV, apply a sine wave signal of 50kHz to INPUT and adjust the oscillator output to produce a waveform of 6 div on the CRT screen.<br>(2) When the frequency is varied to 100 MHz with the oscillator output remaining unchanged, the amplitude on the screen must be over 4.25 div and there must be no sudden dips and peaks during attenuation.<br>(3) Perform the same operations for CH2.<br>Frequency characteristic \| 100MHz: less than −3 dB<br>(4) When the specification are not satisfied, readjust the 1 MHz squarewave characteristics. | | |

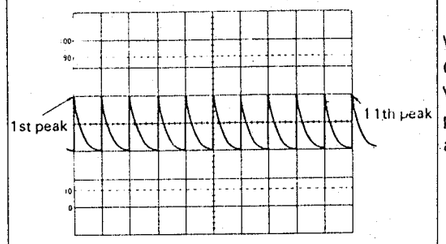
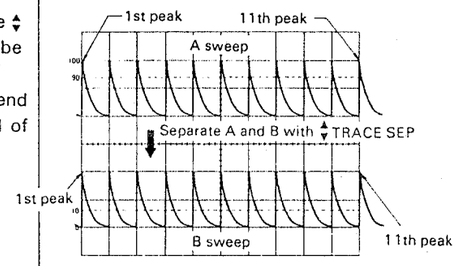
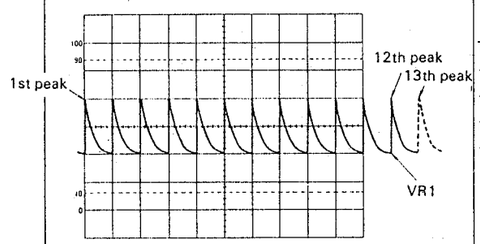
# ADJUSTMENT

| Item | Adjustment Control | P.C.B No. | Test Equipment | Control Setting | Adjustment and Check | Illustration | Remark |
|---|---|---|---|---|---|---|---|
| **Adjustment of CH3 and CH4 Frequency Characteristics** | TC7 (CH3, 1/10) VR5 (CH4, 1/10) | X77-1130 | SG-503<br>50Ω Termination | H. DISPLAY: DUAL<br>V.MODE: QUAD.ALT<br>TRIG. MODE: AUTO<br>A TRIG SOURCE: 1/1<br>B. TRIG SOURCE: 1/1 | (1) Apply a sine wave signal of 50 kHz to CH3 INPUT and adjust the oscillator output to produce a waveform of 6 div on the CRT screen.<br>(2) When the frequency is changed to 100MHz with the oscillator output remaining unchanged, the amplitude on the screen must be over 4.25 div.<br>(3) With A. TRIG SOURCE to 1/10 position adjust TC7 so that the amplitudes at 100MHz are within the specification limits.<br>Frequency characteristic \| 100MHz : less than −3 dB<br>(4) Perform the same operations for CH4.<br>(5) When the specification are not satisfied, readjust the 1 MHz squarewave characteristics.<br>(6) Perform the same adjustment for B TRIG SOURCE (VR5). | | |
| **Check of CH1 and CH2 X5 GAIN Frequency Characteristics** | | | SG-503 | H.DISPLAY: A<br>A TRIG SOURCE: V. MODE<br>TRIG.MODE: AUTO<br>CH1, CH2 AC-GND-DC: DC<br>CH1, CH2 VOLTS/DIV: 5mV<br>CH1, CH2 X5 GAIN: PULL<br>PUSH 50Ω: ON | (1) With V. MODE set to CH1, apply a sine wave signal of 50 kHz to CH1 INPUT and adjust the oscillator output to produce a waveform of 6 div on the CRT screen.<br>(2) When the frequency is varied to 100MHz with the oscillator output remaining unchanged, the amplitude on the screen must be over 4.25 div.<br>(3) Set V. MODE to CH2 and make a similar check.<br>X5 GAIN frequency characteristic \| 100 MHz: less than −3 dB. | | |
| **Check of 20MHz BW Frequency Characteristics** | | | SG-503 | H.DISPLAY: A<br>V.MODE: CH1<br>A TRIG SOURCE: V.MODE<br>CH1 AC-GND-DC: DC<br>CH1 VOLTS/DIV: 5mV<br>20MHz BW: ON<br>TRIG MODE: AUTO<br>PUSH 50Ω: ON | (1) Apply a sine wave signal of 50kHz to CH1 INPUT to produce a waveform of 6 div.<br>(2) Vary the frequency of the input signal without changing the oscillator output and read the frequency at which the amplitude on the screen becomes 4.25 div. This frequency must be within the specification limits.<br>20MHz BW Frequency characteristics \| Frequency of −3 dB: 16 MHz − 24 MHz. | | |
| **Adjustment of CH1 OUT Frequency Characteristics** | TC9 | X73-1320 | 475A<br>50Ω Termination (through type)<br>50Ω coaxial cord (BNC-BNC)<br>SG-503 | CH1 AC-GND-DC: AC<br>CH1 VOLTS/DIV: 5mV<br>CH1 ⇕ POSITION: 12 o'clock<br>PUSH 50Ω: ON | (1) With the vertical axis sensitivity of 475A set to 50mV, lead a 50Ω coaxial cable from CH1 OUT and terminate it with 50Ω termination and connect it to CH1 OUT of 475A.<br>(2) Apply a sine wave signal of 50kHz to CH1 INPUT and adjust the oscillator output so that the vertical amplitude of 475A becomes 6 div. When the frequency is varied to 100MHz without changing the oscillator output adjust TC9 so that, the amplitude on the CRT screen of 475A becomes over 4.25 div.<br>CH1 OUT frequency characteristic \| 100 MHz: less than −3 dB |  | **< Note >**<br>If the squarewave characteristics of CH1 PREAMP and V OUTPUT AMP are readjusted the squarewave characteristic and frequency characteristic will also change. |

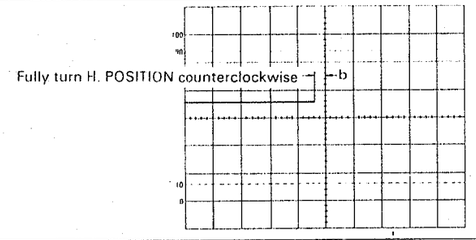
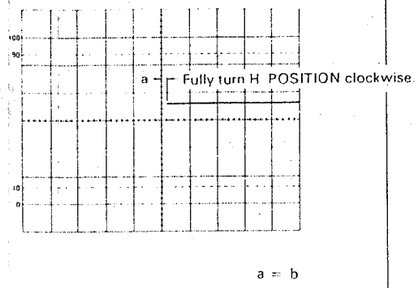
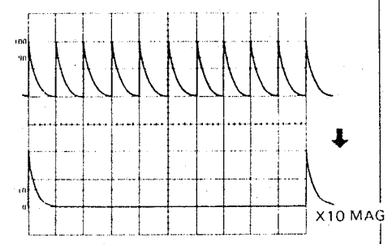
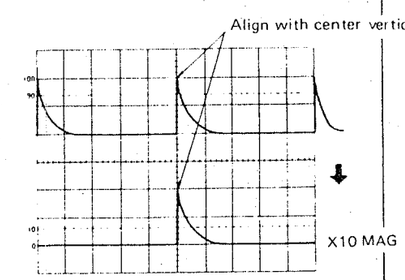
# ADJUSTMENT

| Item | Adjustment Control | P.C.B No. | Test Equipment | Control Setting | Adjustment and Check | Illustration | Remark |
|---|---|---|---|---|---|---|---|
| **Adjustment of CAL Output** | VR1<br>VR2 | X77-1130<br>X77-1130 | 475A<br>FC-754A<br>DL-720 | | (1) Short-circuit TP2 (X77 – 1130) and adjust VR1 so that the voltage at CAL output terminal becomes 0.3 ±1%.<br>(2) Set the vertical axis sensitivity of 475A to 5mV and the sweep time to 0.2 ms.<br>(3) Lead a probe from the calibration voltage output terminal (CAL) of CS-2100 and connect it to CH1 INPUT of 475A.<br>(4) Adjust VR2 so that the frequency becomes 1 kHz.<br>**< Check >**<br>Check the duty ratio.<br>Frequency: Within 1 kHz ±3%.<br>Output voltage: Within 0.3 Vp-p ±1%.<br>Dudy ratio: Within (50 ±2)% |  | <Note><br>For checking the frequency a frequency counter (FC-754A) may be used. |
| **ADJUSTMENT OF HORIZONTAL SWEEP** | | | | | | | |
| **Coarse Adjustment of A and B Trigger Center and SLOPE**<br>**(Coarse Adjustment of A Trigger Center and SLOPE)** | VR2<br>VR3 | X77-1110<br>X77-1110 | SG-502 | H.DISPLAY: A<br>V.MODE: CH1<br>TRIG MODE: AUTO<br>CH1 AC-GND-DC: AC<br>A SWEEP TIME/DIV: 0.2ms<br>A TRIG SOURCE: V. MODE<br>A COUPLING: AC<br>TRIG LEVEL: 12 o'clock<br>TRIG SLOPE: + | (1) Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscilloscope output and ▲▼ position to produce a waveform of amplitude 3 div above and below the horizontal center graticule line on the CRT screen.<br>(2) Adjust VR2 so that the starting point of the waveform is aligned with the horizontal center graticule line on the CRT screen.<br>(3) Set TRIG. SLOPE to (–) and adjust VR3 to bring the starting point to the position of the starting point of the waveform produced when TRIG. SLOPE is set to (+). |  <br>  | |
| **(Coarse Adjustment of B Trigger Center and SLOPE)** | VR2<br>VR3 | X77-1120<br>X77-1120 | SG-502 | H.DISPLAY: DUAL<br>V.MODE: CH1<br>A TRIG SOURCE: V. MODE<br>B TRIG SOURCE: CH1<br>B COUPLING: AC<br>B TRIG LEVEL: 12 o'clock<br>B TRIG SLOPE: +<br>A SWEEP TIME/DIV: 0.5ms<br>B SWEEP TIME/DIV: 0.2ms<br>TRIG. MODE: AUTO<br>▲▼ TRACE SEP: NORM | (1) Set A. INTEN to Fully CCW.<br>(2) Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscillator output and ▲▼ position to produce a waveform of amplitude 3 div above and below the horizontal center graticule line on the CRT screen.<br>(3) Next, set TRIG. SLOPE to (–) and make adjustment to bring the starting point of the waveform to the position of the starting point of the waveform produce when TRIG. SLOPE is set to (+). | | |

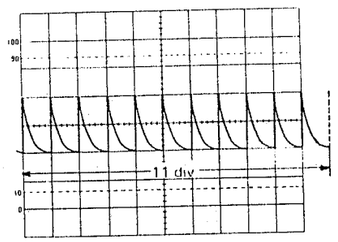
# ADJUSTMENT

| Item | Adjustment Control | P.C.B No. | Test Equipment | Control Setting | Adjustment and Check | Illustration | Remark |
|---|---|---|---|---|---|---|---|
| **Adjustment of A Sweep Time** | VR9 | X74-1320 | TG-501 | H.DISPLAY: A<br>V.MODE: CH1<br>A TRIG SOURCE: V. MODE<br>A SWEEP TIME/DIV: 0.5ms<br>TRIG MODE: AUTO<br>A. VAR: CAL | (1) Apply a marker signal of 0.5 ms to CH1 INPUT.<br>(2) Operate ◂▸ POSITION to bring the first peak of the marker signal to the left end of the graticule line and adjust VR9 for the 11th peak to the right end of the graticule line. |  | <Note><br>When TG-501 is used, set CH1 AC-GND-DC to AC, VOLTS/DIV to 0.5V/div, depress PUSH 50Ω to obtain an input impedance of 50Ω. |
| **Adjustment of B Sweep Time** | VR10 | X74-1320 | TG-501 | H.DISPLAY: DUAL<br>V.MODE: CH1<br>A. TRIG SOURCE: V. MODE<br>B. TRIG SOURCE: CH1<br>A SWEEP TIME/DIV: 0.5ms<br>B SWEEP TIME/DIV: 0.5ms<br>TRIG.MODE: AUTO<br>A,B TRIG.SLOPE: +<br>A,B INTEN: Fully CW | (1) Apply a marker signal of 0.5 ms to CH1 INPUT.<br>(2) On the screen A and B sweeps of CH1 input signal will appear. Operate ▲▼ TRACE SEP to bring these sweeps into the positions where they can be easily adjusted.<br>(3) Make adjustment so that the first peak of B sweep is brought to the left end of the graticule line on the screen and the 11th peak to the right end of graticule line on the screen.<br>(4) Make sure that A and B TRIG'D lamps are on. |  | <Note><br>1. When TG-501 is used, the knobs must be operated in the same manner as described above.<br>2. If the 11th peak is not visible, adjust VR5 (X74-1220) Sweep Length<br>3. The B sweep time will not change even if A VAR is turned. |
| **Adjustment of A Sweep Length** | VR7 | X74-1320 | | H. DISPLAY: A<br>V. MODE: CH1<br>A TRIG SOURCE: V. MODE<br>A SWEEP TIME/DIV: 0.5ms<br>TRIG MODE: AUTO | (1) Apply a marker signal of 0.5 ms to CH1 INPUT.<br>(2) Make adjustment so that the total length is 11 div. |  | <Note><br>Turn ◂▸ POSITION to shift the base line two markers to the left then you can see the 12th time marker with the graticule area. |
| **Adjustment of B Sweep Length** | VR8 | X74-1320 | | H. DISPLAY: DUAL<br>V. MODE: CH1<br>A TRIG SOURCE: V. MODE<br>B TRIG SOURCE: CH1<br>A SWEEP TIME/DIV: 0.5 ms<br>B SWEEP TIME/DIV: 0.5 ms<br>TRIG MODE: AUTO<br>A, B TRIG SLOPE: +<br>A, B INTEN: Fully CW | (1) Apply a marker signal of 0.5 ms to CH1 INPUT.<br>(2) A and B sweeps will appear on the screen. Use ▲▼ TRACE SEP to separate them.<br>(3) Make adjustment so that the total length of B sweep is 11 div. | | |

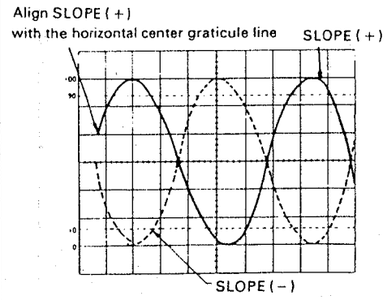
# ADJUSTMENT

| Item | Adjustment Control | P.C.B No. | Test Equipment | Control Setting | Adjustment and Check | Illustration | Remark |
|---|---|---|---|---|---|---|---|
| **Adjustment of A Sweep Position** | VR12 | X74-1320 | | H.DISPLAY: A<br>V. MODE: CH1<br>A TRIG SOURCE: V. MODE<br>A SWEEP TIME/DIV: 0.5 ms<br>TRIG MODE: AUTO | (1) Set CH1 AC-GND-DC to GND to bring the trace to the center of the CRT screen.<br>(2) Set the FINE knob of ◂▸ POSITION to 12 o'clock.<br>(3) Turn ▴▾ POSITION fully CW without turning the FINE knob and note the deviation between the starting point of the trace and the center of the screen. Next, turn ◂▸ POSITION fully CCW and measure the distance between the ending point of the trace and the center of the screen. Make adjustment so that these deviations will have the same width.<br>Width error \| less than 1 div.<br>  |  | |
| **Adjustment of B Sweep Position** | VR11 | X74-1320 | TG-501 | H.DISPLAY: DUAL<br>V.MODE: CH1<br>A TRIG SOURCE: V. MODE<br>B TRIG SOURCE: CH1<br>A,B SWEEP TIME/DIV: 0.5ms<br>TRIG MODE: AUTO<br>A, B TRIG SLOPE: +<br>A, B INTEN: Fully CW | (1) Apply a marker signal of 0.5 ms to CH1 INPUT and align the first peak of A sweep to the leftmost division of the CRT screen.<br>(2) Operate ▴▾ TRACE SEP to separate A sweep and B sweep and set A. VAR to CAL.<br>(3) Make adjustment so that the starting point of B sweep is aligned with that of A sweep in the horizontal position.<br>**<Check>**<br>Operate ▴▾ TRACE SEP so that A sweep and B sweep are superimposed on one another and make sure that their starting points coincide with each other. | | |
| **Adjustment of X10 MAG Gain** | VR13 | X74-1320 | TG-501 | H.DISPLAY: A<br>V.MODE: CH1<br>A TRIG SOURCE: V.MODE<br>A SWEEP TIME/DIV: 0.1ms<br>TRIG MODE: AUTO<br>CH1, VOLTS/DIV: 1V<br>CH1, AC-GND-DC: DC<br>PUSH 50Ω: PUSH | (1) Apply a marker signal of 0.1 ms to CH1 INPUT to produce a waveform of vertical amplitude of about 2 div.<br>(2) Align the first peak of the marker signal with the left end of the graticule line on the CRT screen and the 11th peak with the right end and pull the X10 MAG switch.<br>(3) Make adjustment so that the peak-to-peak distance is 10 div.<br>**<Check>**<br>Specification \| 10 times ±5% |  | |
| **Adjustment of X10 MAG Center** | VR14 | X74-1320 | | H. DISPLAY: A<br>V. MODE: CH1<br>A TRIG SOURCE: V. MODE<br>A SWEEP TIME/DIV: 0.1ms<br>A. VAR: CAL<br>TRIG. MODE: AUTO<br>A, TRIG SLOPE: + | (1) Apply a marker signal of 0.5 ms to CH1 INPUT to produce 3 peaks waveform on the CRT screen.<br>(2) Operate ◂▸ POSITION to bring the central peak to the vertical center graticule line on the screen.<br>(3) Make adjustment so that the waveform will be aligned with the vertical center graticule line on the screen when the FINE knob is pulled out (X10 MAG position).<br>**<Check>**<br>Repeatedly push and pull the FINE knob to make sure that the center of the waveform does not move.<br>Deviation \| less than 1 div. |  | |
| **Adjustment of MAG Center and Gain** | | | | | Recheck the center at ×10 MAG and Gain. | | |

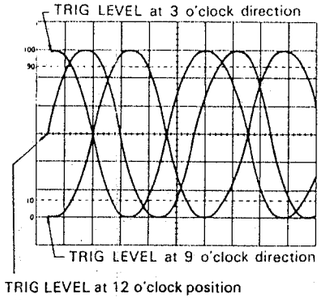
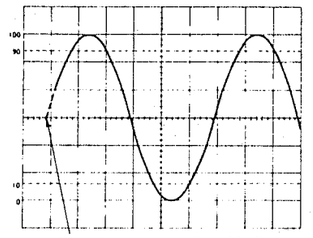
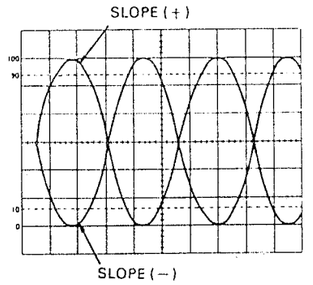
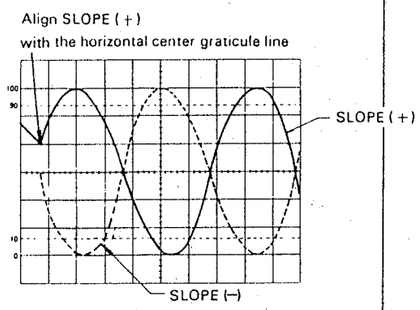
# ADJUSTMENT

| Item | Adjustment Control | P.C.B No. | Test Equipment | Control Setting | Adjustment and Check | Illustration | Remark |
|---|---|---|---|---|---|---|---|
| Adjustment of A Sweep Time, 50ms, 5μs and 0.1μs. | VR2 (50ms)<br>VR1 (5μs)<br>TC1 (0.1μs) | X74-1320 | TG-501 | H. DISPLAY: A<br>V. MODE: CH1<br>A. TRIG SOURCE: V. MODE<br>TRIG. MODE: AUTO<br>A VAR: CAL | (1) With A SWEEP TIME/DIV set to 50ms apply a marker signal of 50ms to CH1 INPUT.<br>(2) Adjust VR2 so that the first peak of the marker signal is aligned with the left end of the graticule on the screen and the 11th peak with the right end.<br>(3) Next. Rotate the A SWEEP TIME/DIV to 5μs and apply a 5μs time marker to CH1 INPUT and adjust VR1 in the same manner as (2).<br>(4) Next, A SWEEP TIME/DIV to 0.1μs and with 0.1μs time marker to CH1 INPUT, adjust TC1 in the same manner as (2). | | |
| Adjustment of B Sweep Time 50ms, 5μs and 0.1μs | VR4 (50ms)<br>VR3 (5μs)<br>TC2 (0.1μs) | X74-1320 | | H.DISPLAY: DUAL<br>V.MODE: CH1<br>A TRIG SOURCE: V. MODE<br>B TRIG SOURCE: CH1<br>A, B TRIG MODE: AUTO<br>A, B TRIG SLOPE: +<br>A, B INTEN: Fully CW | (1) Set A and B SWEEP TIME/DIV to 50ms and apply a marker signal of 50ms to CH1.<br>(2) Operate ▲▼ TRACE SEP to separate A sweep and B sweep to be in the positions where adjustment can be made easily.<br>(3) Adjust VR4 so that the first peak of the marker signal is aligned with the left end of the graticule line on the screen and the 11th peak with the right end.<br>(4) Rotate A. and B. SWEEP TIME/DIV to 5μs and apply a 5μs time marker to CH1 INPUT and adjust VR3 in the same manner as (3).<br>(5) Next, A and B SWEEP TIME/DIV to 0.1μs and with 0.1μs time marker to CH1 INPUT, adjust TC2 in the same manner as (3). | | |
| Adjustment of 0.02μs A Sweep Linearity | TC3 | X74-1320 | | H.DISPLAY: A<br>V.MODE: CH1<br>A TRIG SOURCE: V MODE<br>A SWEEP TIME/DIV : 0.02μs<br>A. VAR: CAL<br>TRIG. MODE: AUTO<br>A. TRIG SLOPE: + | (1) Apply a marker signal to CH1 INPUT.<br>(2) Make adjustment so that the total length of the waveform is 11 div. |  | |
| Adjustment of 0.02μs B Sweep Linearity | TC4 | X74-1320 | | H.DISPLAY: DUAL<br>V.MODE: CH1<br>A TRIG SOURCE: V. MODE<br>B TRIG SOURCE: CH1<br>TRIG MODE: AUTO<br>A, B TRIG SLOPE: +<br>A,B INTEN: Fully CW | (1) With A and B SWEEP TIME/DIV to 0.02 μs, apply a marker signal of 0.02 μs to CH1 INPUT.<br>(2) Operate ▲▼ TRACE SEP to separate A sweep and B sweep into the positions where they can be easily adjusted.<br>(3) Make adjustment so that the total length of the waveform is 11 div. | | |
| Check of Sweep Time Error in All the Range<br>[I] | | | | H.DISPLAY: A<br>V. MODE: CH1<br>A TRIG SOURCE: V. MODE<br>TRIG. MODE: AUTO<br>A VAR: CAL | (1) Apply a reference time marker signal for each range of A SWEEP TIME/DIV.<br>(2) Measure the time error rate and make sure it is within the specification limits.<br>Specification \| Within ±3%. | | |
| [II] | | | | H. DISPLAY: DUAL<br>V. MODE: CH1<br>A TRIG SOURCE: V. MODE<br>B TRIG SOURCE: CH1<br>A. VAR: CAL<br>TRIG. MODE: AUTO<br>A, B TRIG SLOPE: +<br>A, B INTEN: Fully CW | (1) Operate ▲▼ TRACE SEP to separate A sweep and B sweep into the positions where they can be easily adjusted.<br>(2) Apply a reference time marker signal in each of all the ranges (50 ms—0.02 μs) of B sweep.<br>(3) Measure the time error rate and make sure it is within the specification limits.<br>Specification \| Within ±3%. | | |

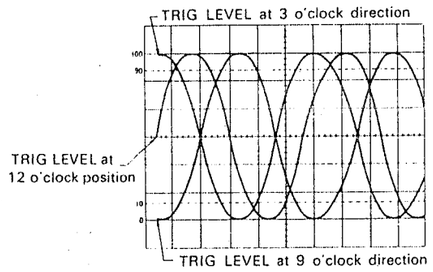
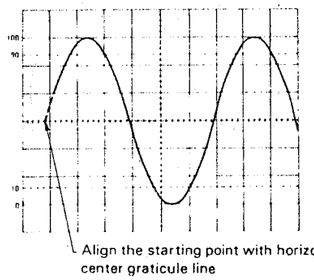
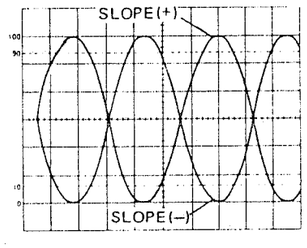
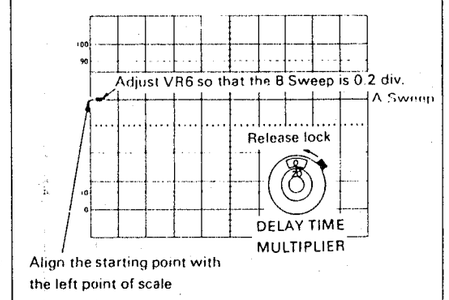
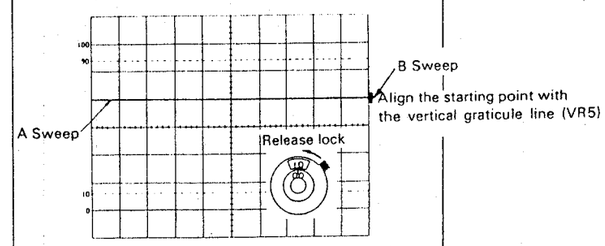
# ADJUSTMENT

| Item | Adjustment Control | P.C.B No. | Test Equipment | Control Setting | Adjustment and Check | Illustration | Remark |
|---|---|---|---|---|---|---|---|
| **ADJUSTMENT OF X — Y OPERATION** | | | | | | | |
| **Adjustment of X Position Center** | VR15 | X74-1320 | | H.DISPLAY: A<br>V. MODE: DUAL, ALT<br>CH1,CH2 VOLTS/DIV: 5mV<br>CH1, CH2 AC-GND-DC: GND<br>A TRIG SOURCE: CH1<br>TRIG. MODE: AUTO<br>A SWEEP TIME/DIV: 0.1ms | (1) Operate ▲▼ POSITION for both CH1 and CH2 to superimpose the two traces on one another in the center of the CRT screen.<br>(2) Make adjustment so that the bright spot comes to the center of the screen when H. DISPLAY is switched in X-Y.<br>**<Check>**<br>Operate CH2 ▲▼ POSITION and make sure that the spot will move as described below.<br>(1) When the knob is turned counterclockwise, the spot moves leftward more than 5 div.<br>(2) When the knob is turned clockwise, the spot moves rightward more than 5 div.<br>Distance between the spot and the center of screen: within ±1 div from the center of the screen. | | **<Note>**<br>When making X-Y adjustment, do not set both CH1 and CH2 to X5. GAIN. |
| **Adjustment of X Gain** | VR18 | X73-1320 | PG-506 | H.DISPLAY: X-Y<br>CH2 AC-GND-DC: AC<br>CH2 VOLTS/DIV: 5mV | (1) Apply a square wave signal of 20 mVp-p 1 kHz to CH2 INPUT and make adjustment so that the horizontal amplitude is 4 div. | | |
| **Readjustment of X Position Center and X Gain** | | | | | Readjust X position Center and X Gain. | | |
| **Check of X Axis Frequency Characteristic** | | | SG-502 | H. DISPLAY: X-Y<br>CH2 AC-GND-DC: DC<br>CH2 VOLTS/DIV: 5mV | (1) Apply a sine wave signal of 1 kHz to CH2 INPUT and adjust the oscillator output to produce a waveform of 10 div.<br>(2) When the frequency is varied to 5 MHz without changing the oscillator output, the amplitude must be over 7.1 div (−3 dB).<br>Frequency characteristic: DC −5 MHz: less than −3 dB. | | |
| **ADJUSTMENT OF TRIGGERING** | | | | | | | |
| **Adjustment of A Trig Slope** | VR3 | X77-1110 | SG-502 | H.DISPLAY: A<br>V.MODE: CH1<br>A TRIG SOURCE: V. MODE<br>A COUPLING: AC<br>CH1, CH2 AC-GND-DC: AC<br>CH1, CH2 VOLTS/DIV: 5mV<br>A SWEEP TIME/DIV: 0.2ms<br>A TRIG SLOPE: +<br>TRIG MODE: AUTO | (1) Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscillator output to produce a waveform of 4∼6 div on the CRT screen.<br>(2) Operate A TRIG LEVEL and CH1 ▲▼ POSITION so that the waveform may have an amplitude equally above and below the horizontal center graticule line on the CRT screen.<br>(3) Set A TRIG SLOPE to (−) and make adjustment so that the starting point of the waveform will be in the position of the starting point of the waveform when A TRIG SLOPE is in the (+) position.<br>**<Check>**<br>(1) Repeatedly turn the A TRIG SLOPE knob from (+) to (−) and make sure that the starting points are in the same positions.<br>(2) Make sure that the rise slope of the waveform will be synchronized when the A TRIG SLOPE knob is in the (+) position and the fall slope will be synchronized when the knob is in the (−) position.<br>(3) Feed the same signal to CH2 and set V MODE to CH2 to produce a waveform of CH2 and make sure that the rise slope of the waveform is synchronized when the A TRIG SLOPE knob is at (+) and the fall slope is synchronized when it is at (−) position. |  | |

# ADJUSTMENT

| Item | Adjustment Control | P.C.B No. | Test Equipment | Control Setting | Adjustment and Check | Illustration | Remark |
|---|---|---|---|---|---|---|---|
| **Adjustment A Trig Level Center and Fix Sensitirity** | VR2<br>VR4 | X77-1110<br>X77-1110 | SG-502 | H.DISPLAY: A<br>V.MODE: CH1<br>A TRIG SOURCE: V. MODE<br>A. COUPLING: AC<br>CH1, CH2 AC-GND-DC: AC<br>CH1, CH2 VOLTS/DIV: 5mV<br>A SWEEP TIME/DIV: 0.2ms<br>A TRIG SLOPE: +<br>TRIG MODE: AUTO | (1) Set A TRIG LEVEL to 12 o'clock.<br>(2) Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscillator output to produce a waveform of 4～6 div on the CRT screen.<br>(3) Operate CH1 ▲▼ POSITION to move the waveform so that its amplitude is equally above and below the horizontal center graticule line on the CRT screen.<br>(4) Adjust VR2 so that the starting point of the waveform is on the horizontal center graticule line on the CRT screen.<br>(5) Pull Fix knob and adjust the sine wave input signal of CH1 to obtain a waveform of 1 div.<br>(6) When A TRIG SLOPE is alternately turned to (+) and (−), adjust VR4 to synchronize.<br>(7) Repeat (2)～(6) procedures for several times.<br>**<Check>**<br>(1) When A TRIG SLOPE is alternately turned to (+) and (−), the starting point must be always on the horizontal center graticule line.<br>(2) With A TRIG SLOPE remaining in the position of (+), turn TRIG LEVEL clockwise toward 3 o'clock from near 9 o'clock and see if the waveform is as shown at right.<br>(3) Adjust the oscillator output so that the waveform amplitude becomes 0.5 div and make sure that synchronization can be obtained by A TRIG LEVEL.<br>  |  <br>Align the starting point with the horizontal center graticule line<br>  | |
| **Adjustment of B Trig Slope** | VR3 | X77-1120 | SG-502 | H.DISPLAY: DUAL<br>V.MODE: CH1<br>A TRIG SOURCE: V. MODE<br>B TRIG SOURCE: CH1<br>A,B COUPLING: AC<br>CH1, CH2 AC-GND-DC: AC<br>CH1, CH2 VOLTS/DIV: 5mV<br>A, B SWEEP TIME/DIV: 0.2ms<br>A. VAR: CAL<br>A, B TRIG.SLOPE: +<br>TRIG MODE: AUTO<br>A, B INTEN: Fully CW | (1) Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscillator output to produce a waveform of 4～6 div on the CRT screen.<br>(2) Operate A TRIG LEVEL, B TRIG LEVEL and CH1 ▲▼ POSITION to move waveform so that its amplitude is equally above and below the horizontal center graticule line on the screen.<br>(3) Set A INTEN to CCW and B INTEN to an arbitrary position near 3 o'clock.<br>(4) Set B TRIG SLOPE to (−) and make adjustment so that the starting point of the waveform comes to the same position of the starting point of waveform when B TRIG SLOPE is in the (−) position.<br>**<Check>**<br>(1) Turn B TRIG SLOPE knob alternately to (+) and (−) and make sure that the starting point is always on the horizontal center graticule line.<br>(2) When B TRIG SLOPE is in the (+) position, the rise slope of the waveform should be synchronized and its fall slope be synchronized at (−).<br>(3) Apply the same signal to CH2 and set V. MODE to CH2 to produce a waveform of B sweep of CH2 on the screen to make sure that the rise slope of the waveform is synchronized when B TRIG SLOPE is at (+) and the fall slope is synchronized at (−). |  | |

# ADJUSTMENT

| Item | Adjustment Control | P.C.B No. | Test Equipment | Control Setting | Adjustment and Check | Illustration | Remark |
|---|---|---|---|---|---|---|---|
| **Adjustment of B Trig Level Center** | VR2 | X77-1120 | SG-502 | H.DISPLAY: DUAL<br>V. MODE: CH1<br>A, B COUPLING: AC<br>CH1, CH2 AC-GND-DC: AC<br>CH1, CH2 VOLTS/DIV: 5mV<br>A, B SWEEP TIME/DIV: 0.2ms<br>A. VAR: CAL<br>B. TRIG SOURCE: CH1 | (1) Turn B TRIG LEVEL knob to 12 o'clock.<br>(2) Apply a sine wave signal of 1 kHz to CH1 INPUT and adjust the oscillator output to produce a waveform of 4～6 div on the CRT screen.<br>(3) Operate CH1 ▲▼ POSITION so that the waveform has an amplitude equally above and below the horizontal center graticule line on the screen.<br>(4) Turn A INTEN to CCW and B INTEN to a position near 3 o'clock and make adjustment so that the starting point of the waveform is on the horizontal center graticule line.<br>**<Check>**<br>(1) Turn B TRIG SLOPE alternately to (+) and (−) and make sure that the starting point of the waveform is always on the horizontal center graticule line.<br>(2) With B TRIG SLOPE knob remaining in the (+) position, turn TRIG LEVEL knob clockwise toward 3 o'clock from near 9 o'clock and see if the waveform appear as shown at right.<br>(3) Adjust the oscillator output so that the waveform amplitude becomes 0.5 div and make sure that synchronization is obtained at this time by operating B TRIG LEVEL.<br>  |  <br>  | |
| **Adjustment of DELAY TIME MULTIPLIER** | VR6<br><br>VR5 | X74-1320<br><br>X74-1320 | | H. DISPLAY: ALT<br>V. MODE: CH1<br>CH1 AC-GND-DC: GND<br>TRIG MODE: AUTO<br>A SWEEP TIME/DIV: 0.1ms<br>B SWEEP TIME/DIV: 1μs<br>▲▼TRACE SEP: NORM<br>STARTS AFTER DELAY: PULL | (1) Set DELAY TIME MULTIPLIER to 0.20.<br>(2) Operate A INTEN and B INTEN properly to make B trace brighter and A trace light dimmer.<br>(3) Operate ◀▶POSITION to bring the starting point of A trace to the left end of the graticule line on the CRT screen.<br>(4) Make adjustment so that B trace may appear as shown at right.<br>(5) Next, set DELAY TIME MULTIPLIER to 10.00.<br>Make adjustment so that B trace may appear as shown at right.<br>(6) Repeat (1) thru (5) 2 or 3 times.<br>**<Check>**<br>Set DELAY TIME MULTIPLIER to 5.00 and make sure that the starting point of B trace is in a position within 5 div ±0.2 div from the left end of the screen. |  <br>  | |

# ADJUSTMENT

| Item | Adjustment Control | P.C.B No. | Test Equipment | Control Setting | Adjustment and Check | Illustration | Remark |
|---|---|---|---|---|---|---|---|
| OPERATING CHECKS | | | | | | | |
| **Check of Current CAL** | | | Current probe P6302 AM503 475A | | (1) Touch a current proble to current CAL terminal on the rear side to make sure that the calibration current is 1 kHz ±3% and 10 mA ±2%. | | |
| **Check of Triggering Sensitivity** | | | SG-502 SG-503 475A | V.MODE: CH1<br>CH1 VOLTS/DIV: 5mV<br>A,B SWEEP TIME/DIV: arbitrary position<br>CH1 AC-GND-DC: AC<br>TRIG MODE: NORM | (1) Make measurements of triggering sensitivity according to the table given below. (For both A and B sweeps)<br>[I] **A Sweep, INT**<br>(1) Set H DISPLAY to A and A TRIG SOURCE to CH1.<br>(2) Apply a sine wave signal to CH1 INPUT, vary the oscillator output and operate A TRIG LEVEL to measure the minimum synchronizing amplitude on the CRT screen. When doing this, make sure that the A TRIG'D lamp is on.<br>Check synchronization by each check frequency.<br>[II] **B Sweep, INT**<br>(1) Set H DISPLAY to B DLY'D, A TRIG SOURCE to CH1 and B TRIG SOURCE to CH1.<br>(2) Apply a sine wave to CH1 INPUT, vary the oscillator output and operate B TRIG LEVEL to measure the minimum synchronizing amplitude. When doing this, make sure that the A TRIG'D and B TRIG'D lamps are on.<br>Check synchronization by each frequency.<br>[III] **A Sweep, Ext**<br>(1) Set H DISPLAY to A and A TRIG SOURCE to EXT 1/1 or 1/10.<br>(2) Apply a signal of the same voltage simultaneously to CH1 and CH4 INPUT.<br>(3) Operate CH1 VOLTS/DIV to produce a waveform of 6 div on the CRT screen.<br>(4) Vary the oscillator output and operate A TRIG LEVEL to measure the minimum synchronizing amplitude by the oscilloscope (475A).<br>Check synchronization by each check frequency.<br>When doing this, make sure that A TRIG'D lamp is on.<br>[IV] **B Sweep, EXT**<br>(1) Set H DISPLAY to ALT, A TRIG SOURCE to CH1 and B TRIG SOURCE to EXT 1/1 or 1/10.<br>(2) Apply a signal of the same voltage simultaneously to CH1 and CH4 INPUT.<br>(3) Operate CH1 VOLTS/DIV to produce a waveform of 6 div on the CRT screen.<br>(4) Operate B TRIG LEVEL and A TRIG LEVEL to synchronize both A sweep and B sweep.<br>(5) Vary the oscillator output and operate B TRIG LEVEL and measure the minimum synchronizing amplitude by the oscilloscope (475A). Check synchronization by each check frequency.<br>(6) Make sure that the B TRIG'D lamp is on. | | |

# ADJUSTMENT

| Item | Adjustment Control | P.C.B No. | Test Equipment | Control Setting | Adjustment and Check | Illustration | Remark |
|---|---|---|---|---|---|---|---|

**[V] Check of triggering sensitivity**

| COUPLING (TRIG. SOURCE) | FREQ RANGE (Hz) | Trig. sensitivity (Min. sync amplitude) | | |
|---|---|---|---|---|
| | | TRIG. SOURCE V.MODE (CH1 or CH2) | TRIG SOURCE EXT 1/1 | TRIG SOURCE EXT 1/10 |
| AC | 20Hz～20MHz | 0.5div | 50mVP-p | 0.5Vp-p |
| | ～50MHz | 1 div | 100mVp-p | 1 Vp-p |
| | ～100MHz | 1.5div | 150mVp-p | 1.5Vp-p |
| DC | DC～20MHz | 0.5div | 50mVp-p | 0.5Vp-p |
| | ～50MHz | 1 div | 100mVp-p | 1 Vp-p |
| | ～100MHz | 1.5div | 150mVp-p | 1.5Vp-p |
| AC $HF_{REJ}$ | 1kHz | 0.5div | 50mVp-p | 0.5Vp-p |
| | 1MHz | Not to be synchronized at 1 div | Not to be synchronized at 100mVp-p | Not to be synchronized at 1Vp-p |
| AC $LF_{REJ}$ | 1MHz | 0.5div | 50mVp-p | 0.5Vp-p |
| | 1kHz | Not to be synchronized at 1 div | Not to be synchronized at 100mVp-p | Not to be synchronized at 1Vp-p |
| VIDEO | VIDEO signal FRAME LINE | 0.5div | 50mVp-p | 0.5Vp-p |

**[VI] Check of triggering sensitivity by TRIG. MODE**

H. DISPLAY : A, A SOURCE : AC

| COUPLING (TRIG. SOURCE) | FREQ RANGE (Hz) | Trig. sensitivity (Min. sync. amplitude) | | |
|---|---|---|---|---|
| | | TRIG SOURCE V.MODE (CH1 or CH2) | TRIG. SOURCE EXT 1/1 | TRIG. SOURCE EXT 1/10 |
| AUTO | 30Hz～20MHz | 0.5div | 50mVp-p | 0.5Vp-p |
| | ～50MHz | 1 div | 100mVp-p | 1 Vp-p |
| | ～100MHz | 1.5div | 150mVp-p | 1.5Vp-p |
| FIX | 40Hz～20MHz | 1.0div | 100mVp-p | 1.0Vp-p |
| | ～80MHz | 1.5div | 150mVp-p | 1.5Vp-p |

**[VII] Check of trig source (A sweep)**

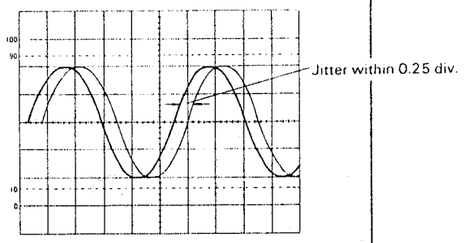
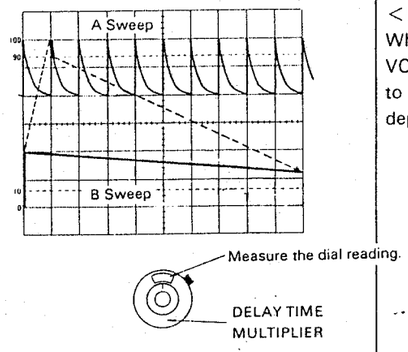
① TRIG MODE: AUTO, H.DISPLAY: A

② Applied different signals to CH1～CH4 and operate A SOURCE as described below and make sure to operate as follow.

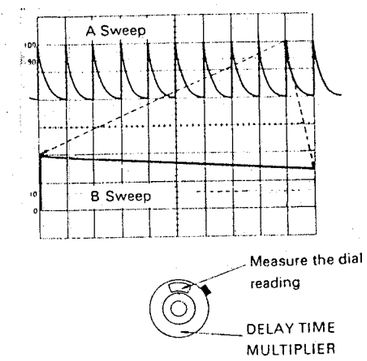
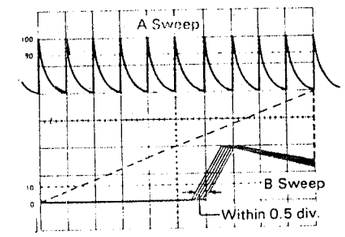
| A SOURCE | Operation |
|---|---|
| V.MODE | V.MODE→ CH1 The signal of CH1 is synchronized with A sweep<br>V.MODE→ CH2 The signal of CH2 is synchronized with A sweep<br>V.MODE→ DUAL, ALT<br>When the signals of CH1 and CH2 are superimposed on one another they are synchronized with the A sweep of CH1 and CH2, respectively, but there will be no synchronization when there is no signal<br>V. MODE→DUAL, CHOP No Sync.<br>V. MODE→ADD<br>Synchronized with the signal of CH2 when CH1 + CH2 (CH1 − CH2 at CH2 INV)<br>V.MODE→ QUAD, ALT<br>When the signals of CH1～CH4 are superimposed on one another on the CRT screen, the signals will be synchronized with the A sweep of CH1～CH4 respectively but there will be no sync when there is no signal.<br>V.MODE→QUAD, CHOP No Sync. |
| CH1 | The signal of CH1 is synchronized with A sweep |
| CH2 | The signal of CH2 is synchronized with A sweep |
| EXT 1/1 | The signal of CH3 is synchronized with A sweep |
| EXT 1/10 | The signal of CH3 is attenuated to 1/10 and synchronized with A sweep. |

③ Check sync by the lighting of A TRIG'D lamp

# ADJUSTMENT

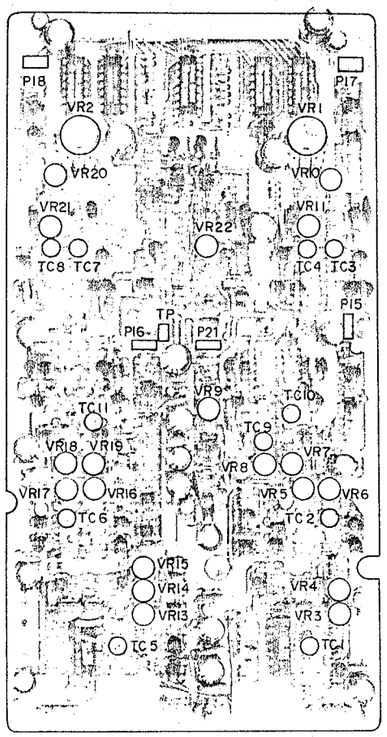
<table>
<tr><th>Item</th><th>Adjustment Control</th><th>P.C.B No.</th><th>Test Equipment</th><th>Control Setting</th><th>Adjustment and Check</th><th>Illustration</th><th>Remark</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>[VIII] Check of trig source (B sweep)<br>(1) Set H DISPLAY to A, TRIG MODE to AUTO, V MODE to DUAL, ALT and A TRIG SOURCE to V MODE.<br>(2) Apply different signals to CH1, CH2 and CH4 and superimpose the signals of CH1 and CH2 on one another on the CRT screen and synchronize them by A TRIG LEVEL.<br>(3) Set H DISPLAY to B DLY'D and operate B SOURCE as described below to check the synchronization.
<table>
<tr><th>B TRIG SOURCE</th><th>Operation</th></tr>
<tr><td>CH1</td><td>The signal of CH1 is synchronized with B sweep.</td></tr>
<tr><td>CH2</td><td>The signal of CH2 is synchronized with B sweep.</td></tr>
<tr><td>EXT 1/1</td><td>The signal of CH4 is synchronized with B sweep.</td></tr>
<tr><td>1/10</td><td>The signal of CH4 is attenuated to 1/10 and synchronized with B sweep.</td></tr>
</table>
(4) Make sure that the B TRIG'D lamp is on.</td><td></td><td></td></tr>
<tr><td>Check of Jitter</td><td></td><td></td><td>SG503</td><td>H.DISPLAY: A<br>A.TRIG SOURCE: CH1<br>TRIG MODE: NORM<br>A COUPLING: AC<br>A SWEEP TIME/DIV: 0.02μs<br>CH1 VOLTS/DIV: 0.1V<br>CH1 AC-GND-DC: AC<br>X10 MAG: PULL<br>CH1 PUSH 50Ω: PUSH<br>HOLDOFF: NORM</td><td>(1) Apply a sine wave signal of 100 MHz to CH1 INPUT and adjust the oscillator output ot produce a waveform of 4 div on the CRT screen.<br>(2) Operate A TRIG LEVEL to find a point where the jitter is minimized.
<table>
<tr><td>Jitter</td><td>Less than 0.25 div</td></tr>
</table></td><td> 
</td><td></td></tr>
<tr><td>Operational Check of DELAY TIME MULTIPLIER</td><td></td><td></td><td>TG-501</td><td>H.DISPLAY: ALT<br>A, B TRIG SOURCE: CH1<br>TRIG MODE: AUTO<br>V. MODE: CH1<br>STARTS AFTER DELAY: PULL<br>CH1 AC-GND-DC: AC<br>A SWEEP TIME/DIV: 1ms<br>B SWEEP TIME/DIV: 5μs</td><td>(1) Apply a marker signal of 1 ms to CH1 INPUT produce a waveform of 2～3 div on the CRT screen.<br>(2) Operate ▲▼ TRACE SEP to separate B sweep and A sweep.<br>(3) Operate ◂▸ POSITION to align the first peak of the waveform with the left end of the screen.<br>(4) Adjust A INTEN and B INTEN to bring the waveform into the positions where they can be easily visible.<br>(5) Operate DELAY TIME MULTIPLIER so that the patterns of the screen appear as shown at right (the second peak of the A sweep should be intensity modulated and should be aligned with the left end of B sweep scale) and note the dial reading at this time.</td><td> 
</td><td>＜Note＞<br>When TG-501 is used, CH1 VOLTS/DIV should be set to 0.5V and PUSH 50Ω be depressed.</td></tr>
</table>

# ADJUSTMENT

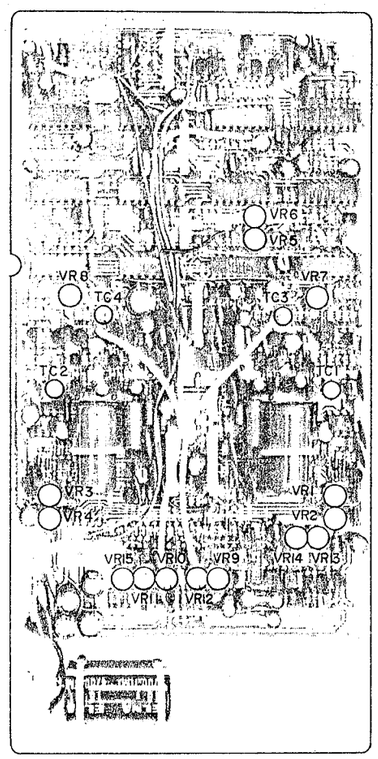
| Item | Adjustment Control | P.C.B No. | Test Equipment | Control Setting | Adjustment and Check | Illustration | Remark |
|---|---|---|---|---|---|---|---|
| | | | | | (6) Turn DELAY TIME MULTIPLIER and operate ◂▸ POSITION so that what is shown at right will happen at the 10th peak and note the dial reading at this time.<br>(7) Make the following calculation from the dial reading to make sure that the error is within the specification limits.<br>(B) − (A) = 8.00 ±0.2<br>Time multiplication error: within ±2% |  | |
| **Check of DELAY TIME Jitter** | | | TG-501 | H.DISPLAY: ALT<br>A TRIG SOURCE: CH1<br>B TRIG SOURCE: CH2<br>TRIG MODE: AUTO<br>V. MODE: CH1<br>STARTS AFTER DELAY: PULL<br>B ENDS A: ON<br>CH1 AC-GND-DC: AC<br>A SWEEP TIME/DIV: 1ms<br>B SWEEP TIME/DIV: 1μs | (1) Apply a marker signal of 1 ms to CH1 INPUT to produce a waveform of 2～3 div on the CRT screen<br>(2) Operate ▲▼ TRACE SEP to separate A sweep and B sweep.<br>(3) Operate DELAY TIME MULTIPLIER to obtain the patterns as shown at right. (DELAY TIME MULTIPLIER is to be set to about 10.00).<br>(4) Make sure that the jitter of B sweep is less than 0.5 div at this time.<br>Specification: Less than 1/20,000 |  | |
| **Adjustment of Beam Finder** | VR 1 | X74-1230 | | H. DISPLAY: A<br>A TRIG SOURCE: V.MODE<br>TRIG MODE: AUTO<br>V.MODE: CH1<br>CH1, AC-GND-DC: GND<br>A. SWEEP TIME/DIV: 0.1ms<br>◀▶POSITION: 12 o'clock<br>A. INTEN: 12 o'clock | (1) Adjust VR1 so that the trace length becomes 6 div while depressing BEAM FINDER.<br>(2) Make sure that the trace length is fully covered the screen when rotated SWEEP TIME/DIV to each range: | | |

# ADJUSTMENT

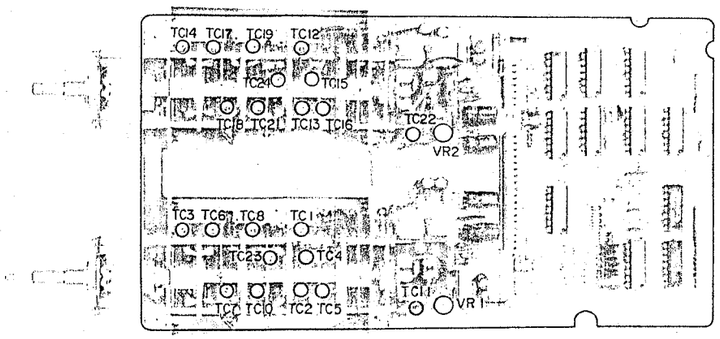
X73-1320-00



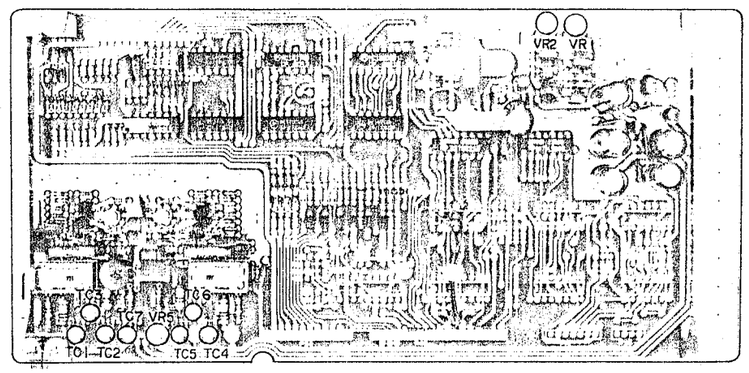

X74-1320-00



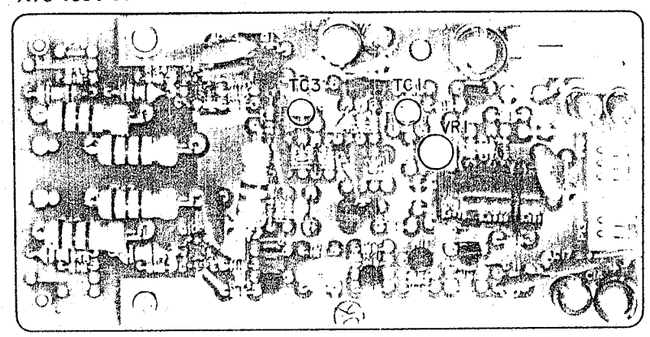

X75-1120-00



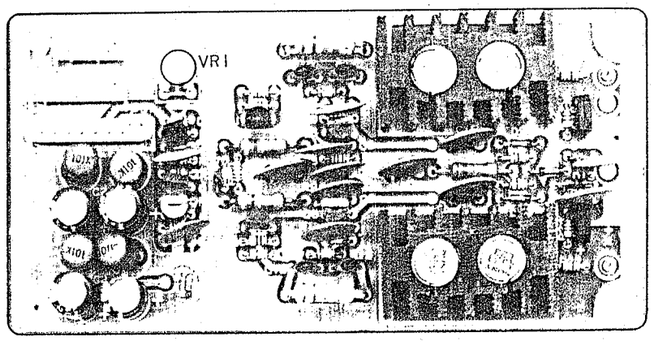

X77-1130-00



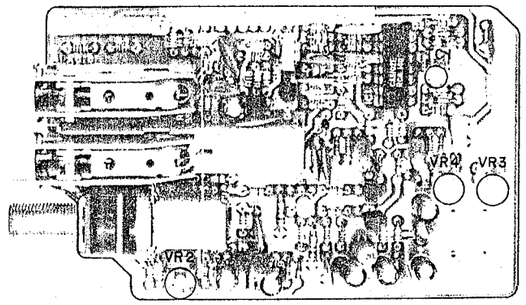

X73-1330-00



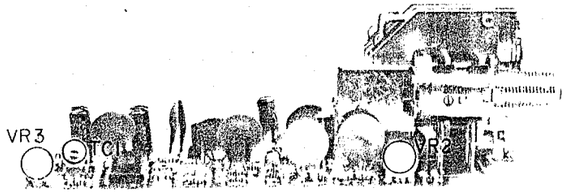

X74-1220-00



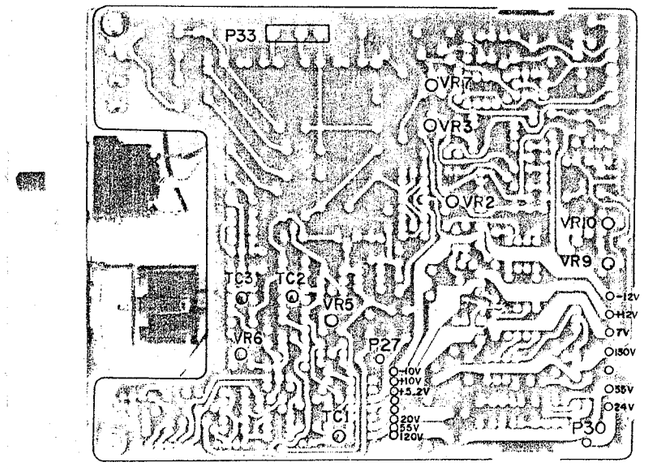

X77-1110-00



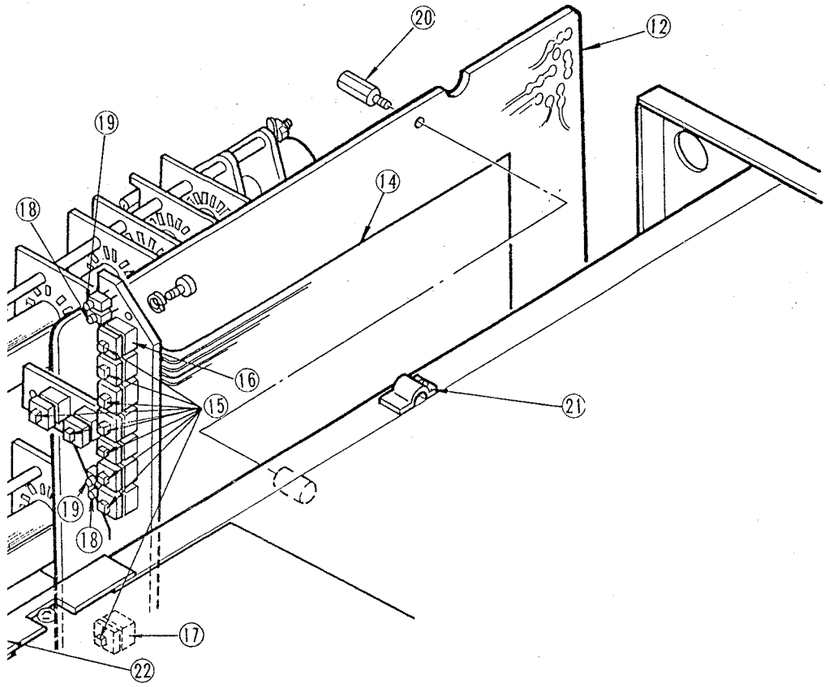

X77-1120-00

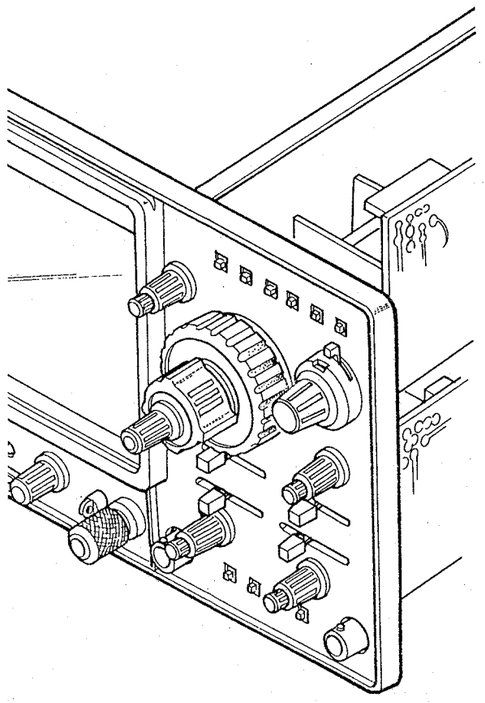



X68-1310-00



Y



# PARTS LIST

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | Serial No. Eff. | Remarks |
|---|---|---|---|---|---|
| 2-1 | | A22-0816-13 | Sub panel | | |
| 2-2 | | E04-0251-05 | BNC jack | | |
| 2-3 | | E23-0519-04 | Earth lug | | |
| 2-4 | | K27-0504-04 | Push knob | | |
| 2-5 | | S31-2506-05 | Slide switch | | |
| | S25 | S31-2506-05 | Slide switch | | |
| 2-6 | S23 | S40-2403-05 | Push switch | | |
| | S24 | S40-2403-05 | Push switch | | |
| 2-7 | | E23-0521-04 | Earth terminal | | |
| 2-8 | | F11-0961-04 | Shield case | | |
| 2-9 | | F11-0964-04 | Shield case | | |
| 2-10 | | F11-0965-04 | Shield case | | |
| 2-11 | | F11-0966-04 | Shield case | | |
| 2-12 | | X75-1120-00 | Vertical ATT unit | | |
| | | J25-2977-03 | Printed circuit board | | |
| 2-13 | | S01-4503-05 | Rotary switch | | |
| 2-14 | | J25-2898-03 | Printed circuit board | | |
| 2-15 | | K27-0524-14 | Push knob | | |
| 2-16 | S1 | S40-1504-05 | Tact switch | | |
| | S2 | S40-1504-05 | Tact switch | | |
| | S3 | S40-1504-05 | Tact switch | | |
| | S4 | S40-1504-05 | Tact switch | | |
| | S5 | S40-1504-05 | Tact switch | | |
| | S6 | S40-1504-05 | Tact switch | | |
| | S7 | S40-1504-05 | Tact switch | | |
| | S8 | S40-1504-05 | Tact switch | | |
| | S9 | S40-1504-05 | Tact switch | | |
| 2-17 | S20 | S40-1505-05 | Tact switch | | |
| 2-18 | | K-14LN222RP | LED | | |
| 2-19 | | K-14LN322GP | LED | | |
| 2-20 | | N08-0609-04 | Post (Hex) | | |
| 2-21 | | E23-0522-14 | Earth plate | | |
| 2-22 | | G13-0714-04 | Cushion | | |
| | | N16-0026-46 | Lockwasher | | |
| | | N16-0030-46 | Lockwasher | | |
| | | N30-2604-46 | Pan-head screw M2.6 × 4 | | |
| | | N30-3006-46 | Pan-head screw M3 × 6 | | |
| | | N32-2004-46 | Flat-head screw M2 × 4 | | |
| | | N32-3006-46 | Flat-head screw M3 × 6 | | |
| | | N09-0707-05 | Flat-head screw (Tapping) 3 × 18 | | |

# DISASSEMBLY

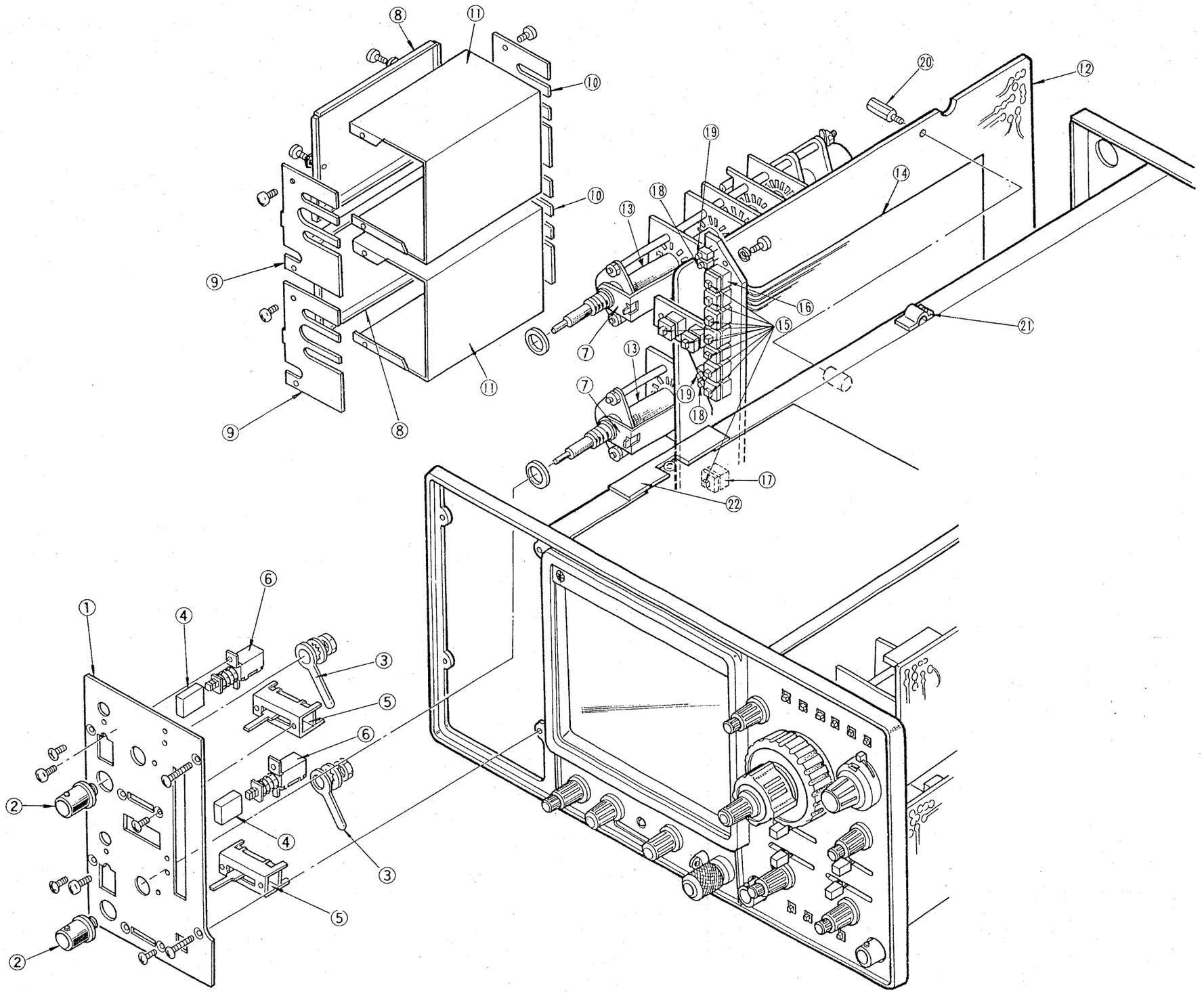
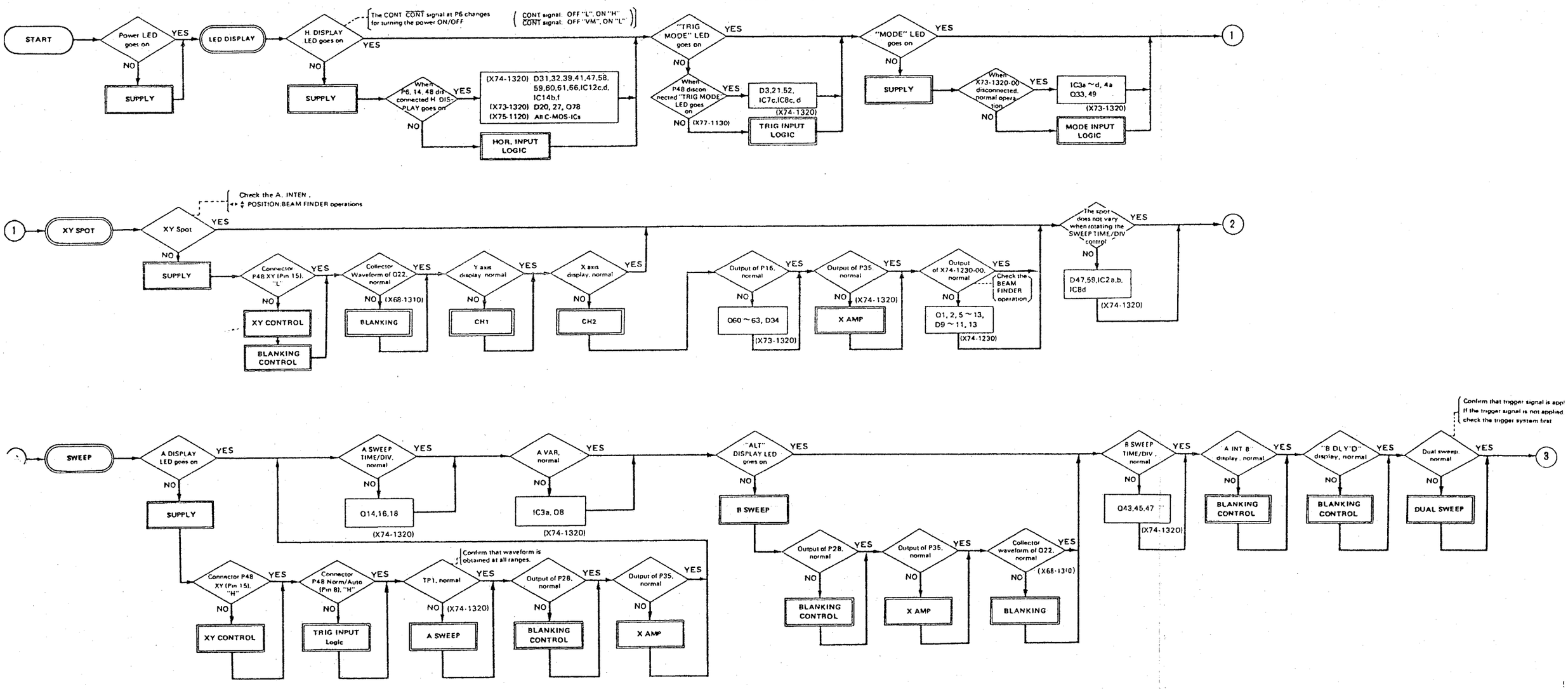
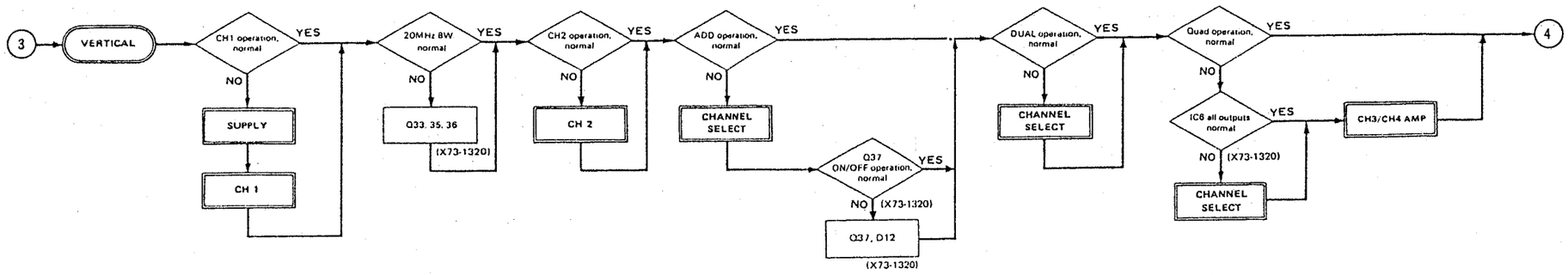


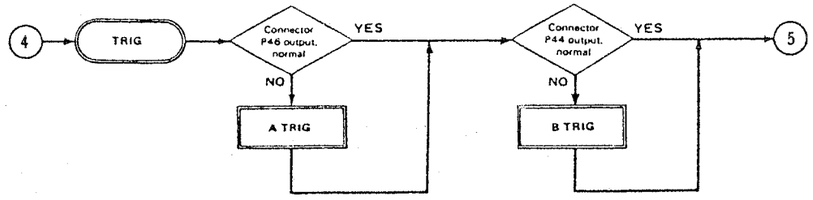


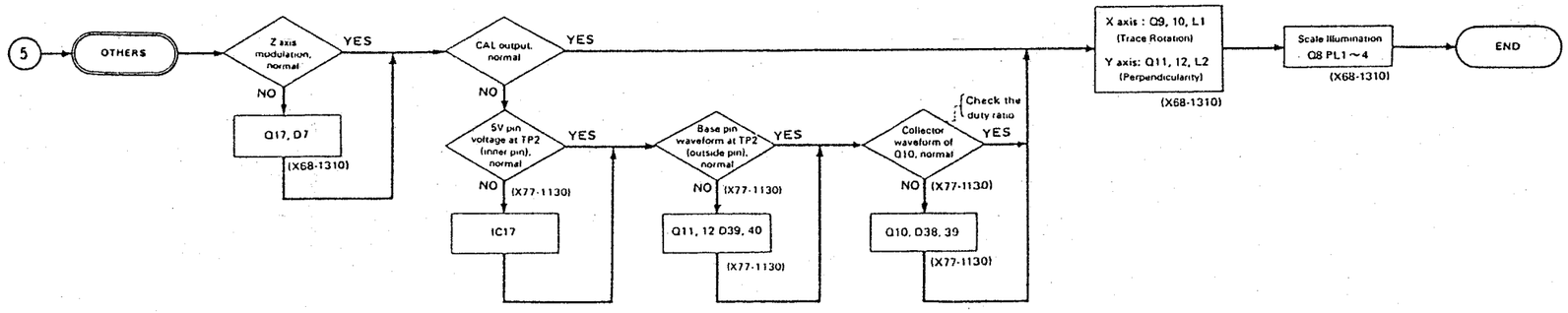
Fig. Index
2-1
2-2
2-3
2-4
2-5
2-6
2-7
2-8
2-9
2-10
2-11
2-12
2-13
2-14
2-15
2-16
2-17
2-18
2-19
2-20
2-21
2-22

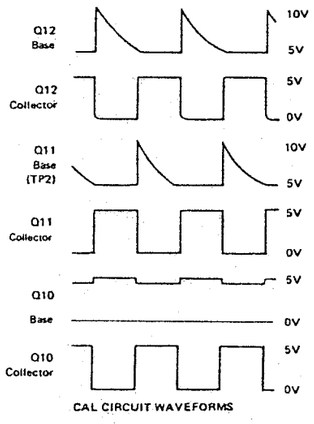
# TROUBLESHOOTING





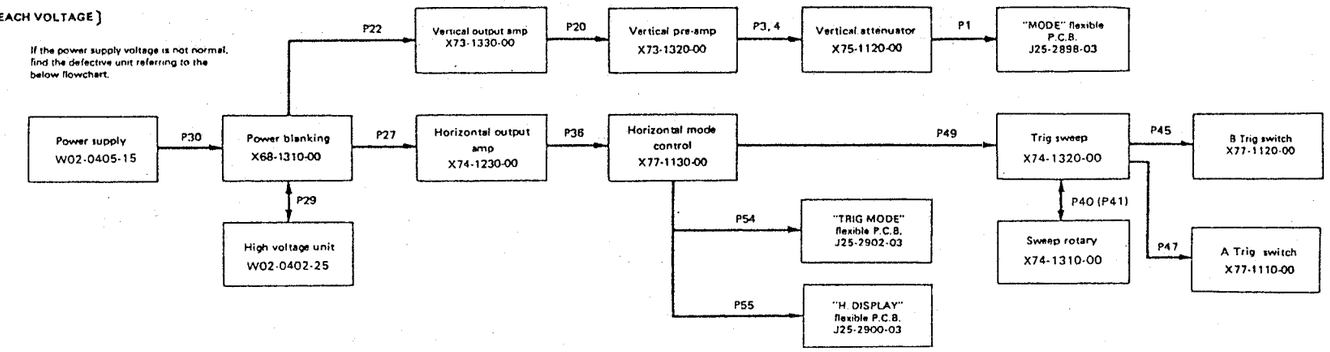



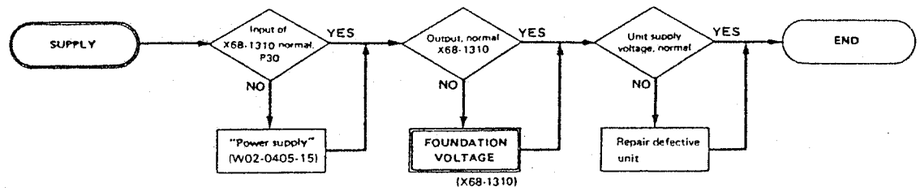

CAL CIRCUIT WAVEFORMS

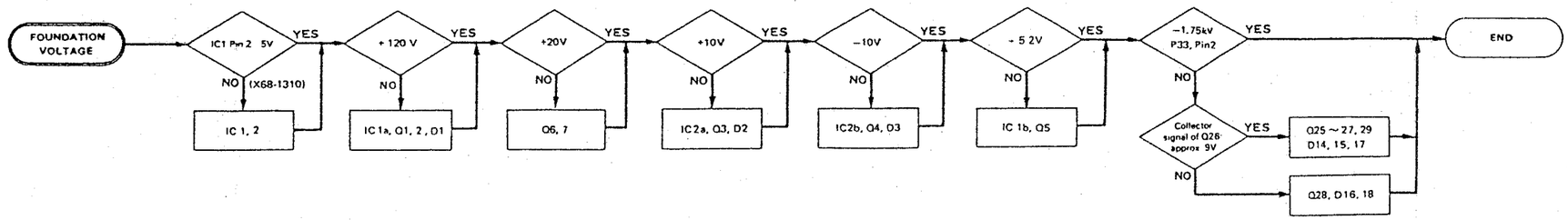
# TROUBLESHOOTING

〔 POWER SUPPLY OF EACH VOLTAGE 〕

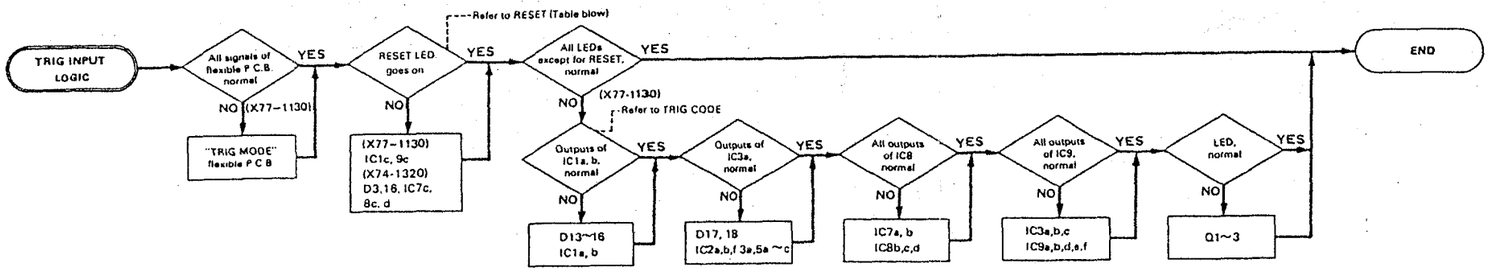
If the power supply voltage is not normal, find the defective unit referring to the below flowchart.

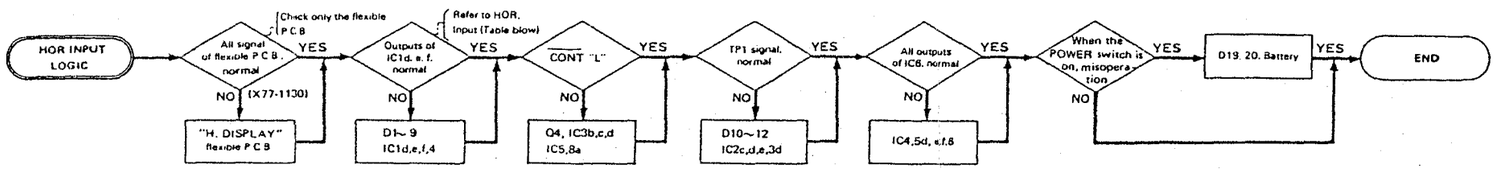


# TROUBLESHOOTING




**RESET (TRIG MODE "SINGLE")**

| RESET | Qt | Qt + 1 | |
|---|---|---|---|
| PUSH (TRIG MODE SINGLE) | P48 10Pin | IC2b 3 Pin | IC3a 3 Pin |
| | ⌐¦ | L | L |

**TRIG CODE**

| TRIG MODE PUSH | Qt | | Qt + 1 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IC1 | IC3 | IC7 | | | | IC8-4 IC5-3 | IC8-11 IC5-5 | IC8-10 IC5-7 | IC9 | | | |
| | 4 Pin | 2 Pin | 3 Pin | 13 Pin | 12 Pin | 1 Pin | 2 Pin | | | | 8 Pin | 10 Pin | 12 Pin | 4 Pin | 2 Pin |
| AUTO | ∫ | L | ∫ | H | L | L | H | L | H | H | H | L | L | H | H |
| NORM | L | ∫ | ⌐ | L | H | H | L | H | L | H | L | H | L | L | H |
| SINGLE | ∫ | ∫ | ⌐ | H | L | H | L | H | H | L | L | L | H | H | L |

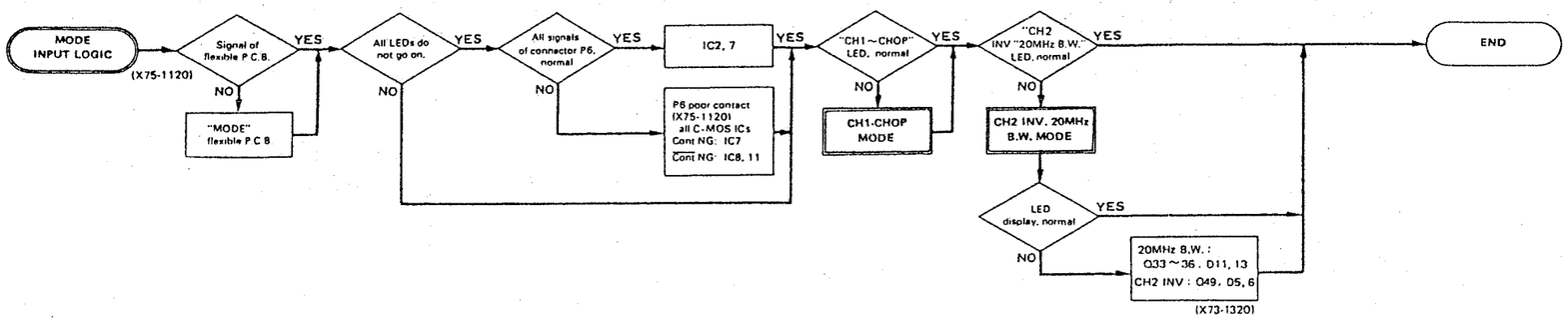
Qt Logical value when the switch is depressed.
Qt + 1 Logical value after the switch is depressed.

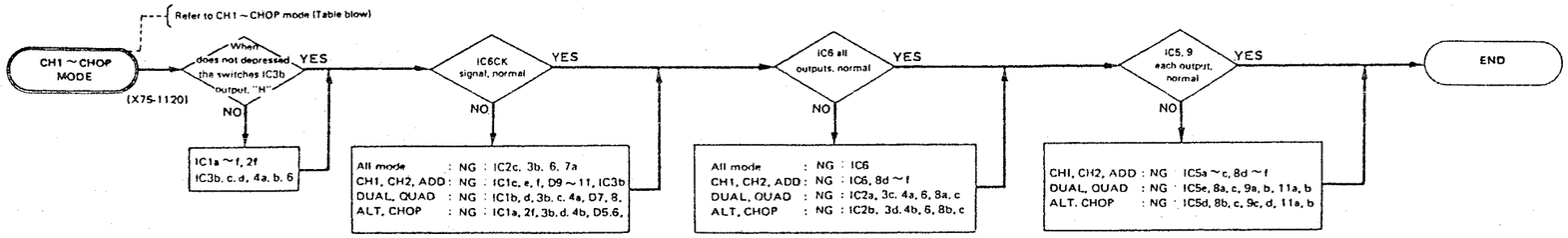
**HOR. INPUT**

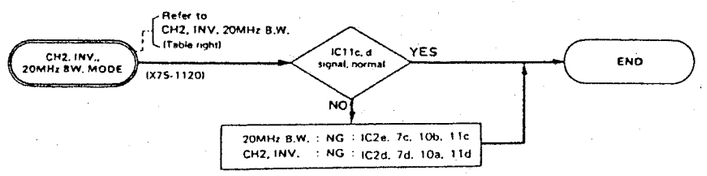
| H. DISPLAY PUSH | Qt | | | | Qt + 1 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IC1 OUTPUT | | | TP1 | IC5 1 pin ~ 15 pin | IC4 2 pin IC5 13 pin | IC4 5 pin IC5 11 pin | IC4 7 pin IC5 9 pin | IC6 OUTPUT | | | | | |
| | 12f | 10e | 8d | | | | | | 2 | 3 | 4 | 5 | 6 | 7 | OTHER OUTPUT |
| A | L | L | ∫ | ∫ | L | L | L | H | L | H | H | H | H | H | H |
| ALT | L | ∫ | L | ∫ | L | L | H | L | H | L | H | H | H | H | H |
| A-INT-B | L | ∫ | ∫ | ∫ | L | L | H | H | H | H | L | H | H | H | H |
| B | ∫ | L | L | ∫ | L | H | L | L | H | H | H | L | H | H | H |
| DUAL | ∫ | L | ∫ | ∫ | L | H | L | H | H | H | H | H | L | H | H |
| X-Y | ∫ | ∫ | L | ∫ | L | H | H | L | H | H | H | H | H | L | H |

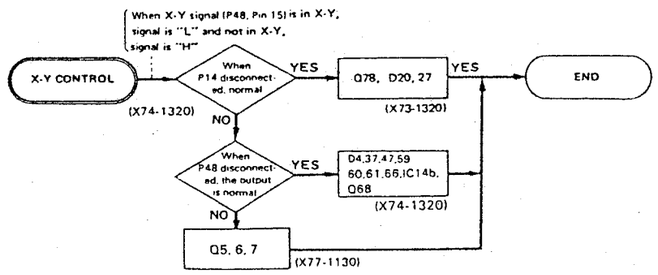
Qt Logical value when the switch is depressed.
Qt + 1 Logical value after the switch is depressed

# TROUBLESHOOTING





Refer to CH1~CHOP mode (Table blow)
CH1~CHOP MODE
(X75-1120)
When does not depressed the switches IC3b output, "H"
YES
NO
IC1a~f, 2f
IC3b. c. d, 4a. b. 6
IC6CK signal, normal
YES
NO
All mode : NG : IC2c. 3b. 6. 7a
CH1, CH2, ADD : NG : IC1c, e, f, D9~11, IC3b
DUAL, QUAD : NG : IC1b, d, 3b. c. 4a, D7. 8.
ALT, CHOP : NG : IC1a, 2f, 3b.d. 4b, D5.6,
IC6 all outputs, normal
YES
NO
All mode : NG : IC6
CH1, CH2, ADD : NG : IC6, 8d~f
DUAL, QUAD : NG : IC2a, 3c. 4a, 6, 8a, c
ALT, CHOP : NG : IC2b. 3d. 4b, 6, 8b, c
IC5, 9 each output, normal
YES
NO
CH1, CH2, ADD : NG : IC5a~c, 8d~f
DUAL, QUAD : NG : IC5e, 8a, c, 9a, b, 11a, b
ALT, CHOP : NG : IC5d, 8b, c, 9c, d, 11a, b
END


Refer to CH2, INV, 20MHz B.W. (Table right)
CH2, INV., 20MHz BW, MODE
(X75-1120)
IC11c, d signal, normal
YES
NO
END
20MHz B.W. : NG : IC2e. 7c. 10b. 11c
CH2, INV. : NG : IC2d. 7d. 10a. 11d




CH2 INV.

| | Qt | Qt + 1 |
|---|---|---|
| CH2 INV PUSH | IC10a INPUT | IC10a OUTPUT |
| | (T) | (Qa) |
| | ⌐¬ | $\overline{Qa}$ |

20MHz B.W.

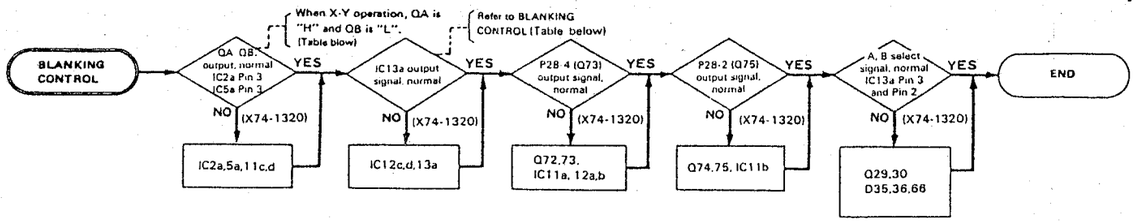
| | Qt | Qt + 1 |
|---|---|---|
| 20MHz B.W PUSH | IC 10b INPUT | IC10b OUTPUT |
| | (T) | (Qb) |
| | ⌐¬ | $\overline{Qb}$ |

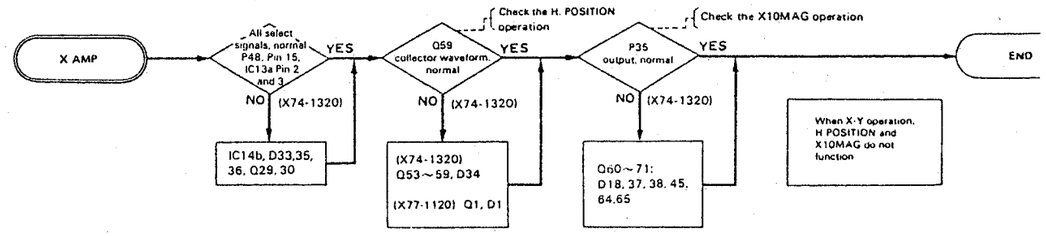
CH1~CHOP MODE

| "MODE" PUSH | Qt | | | | Qt + 1 | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IC3b IN ~ OUT | | | IC6 CK | CH1 / CH2 / ADD | | | | | | IC6 Q2 | DUAL QUAD | | | | ALT CHOP | | | |
| | IN Pin 5 | IN Pin 6 | OUT Pin 4 | | IC6 Q5 | IC6 Q4 | IC6 Q3 | IC5 a | IC5 b | IC5 c | | IC4a Qa | IC6 Qn | IC9 OUTPUT b | IC9 OUTPUT a | IC4b Qb | IC6 Q1 | IC9 OUTPUT c | IC9 OUTPUT d |
| CH1 | L | ⌐ | ⌐ | ⌐ | H | L | L | L | H | H | H | Qat | Qat | H | H | Qbt | Qbt | H | H |
| CH2 | L | ⌐ | ⌐ | ⌐ | L | H | L | H | L | H | H | Qat | Qat | H | H | Qbt | Qbt | H | H |
| DUAL | ⌐ | L | ⌐ | ⌐ | L | L | L | H | H | H | L | L | L | L | H | Qbt | Qbt | Qbt | Qbt |
| ADD | L | ⌐ | ⌐ | ⌐ | L | L | H | H | H | L | H | Qat | Qat | H | H | Qbt | Qbt | H | H |
| QUAD | ⌐ | L | ⌐ | ⌐ | L | L | L | H | H | H | L | H | H | H | L | Qbt | Qbt | Qbt | Qbt |
| ALT | ⌐ | L | ⌐ | ⌐ | L | L | L | H | H | H | L | Qat | Qat | Qbt | $\overline{Qbt}$ | H | L | L | H |
| CHOP | ⌐ | L | ⌐ | ⌐ | L | L | L | H | H | H | L | Qat | Qat | Qbt | $\overline{Qbt}$ | L | H | H | L |

Qt : Logical value when the switch is depressed
Qt + 1 : Logical value after the switch is depressed
Qkt : Indicates that Qkt which is the logical value before the switch is depressed is output when the switch is depressed.

# TROUBLESHOOTING


BLANKING CONTROL
When X-Y operation, QA is "H" and QB is "L". (Table blow)
Refer to BLANKING CONTROL (Table below)
QA QB: output, normal IC2a Pin 3 IC5a Pin 3
YES
NO (X74-1320)
IC2a,5a,11c,d
IC13a output signal, normal
IC12c,d,13a
P28-4 (Q73) output signal, normal
Q72,73, IC11a, 12a,b
P28-2 (Q75) output signal, normal
Q74,75, IC11b
A, B select signal, normal IC13a Pin 3 and Pin 2
Q29,30 D35,36,66
END

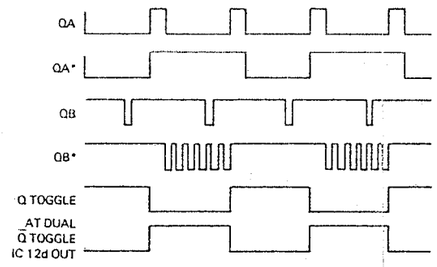

X AMP
All select signals, normal P48, Pin 15, IC13a Pin 2 and 3
YES
NO (X74-1320)
IC14b, D33,35, 36, Q29, 30
Q59 collector waveform, normal
Check the H. POSITION operation
(X74-1320) Q53～59, D34
(X77-1120) Q1, D1
P35 output, normal
Check the X10MAG operation
Q60～71: D18, 37, 38, 45, 64,65
When X-Y operation, H POSITION and X10MAG do not function
END

**BLANKING CONTROL**

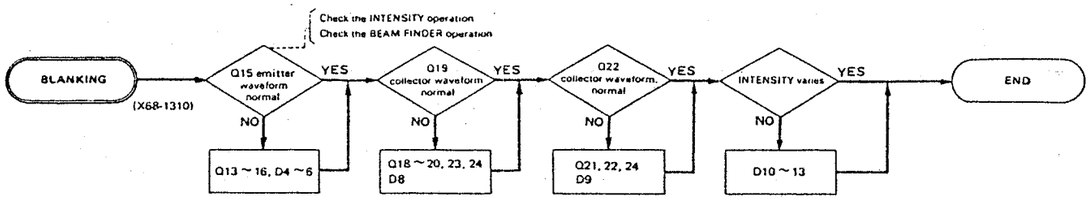
| H DISPLAY | P48 X-Y BUFFER 15Pin | IC13a IN S | IC13a IN R | IC13a OUT Q | IC13a OUT $\overline{Q}$ | IC12d OUT | P28 A blanking 4 Pin | P28 B blanking 2 Pin |
|---|---|---|---|---|---|---|---|---|
| A | H | H | L | H | L | H | QA | H |
| ALT | H | L | L | TOGGLE | | H | QA* | QB |
| A-INT-B | H | H | L | H | L | H | QA | QB |
| B-DLY'D | H | L | H | L | H | H | H | QB |
| DUAL | H | L | L | TOGGLE | | TOGGLE | QA* | QB* |
| X-Y | L | H | L | H | L | H | L | H |

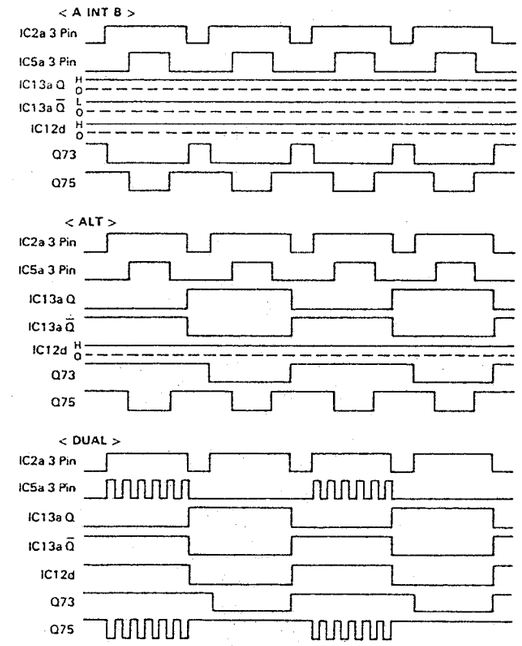
The $\overline{QA}$ and $\overline{QB}$ in the table show the reverse phase of QA and AB described

*1 Complex waveform IC 11b and QA signals.
*2 Complex waveform IC11b output. When CHOP operation, output of P28 is complex CHOP signal waveform.



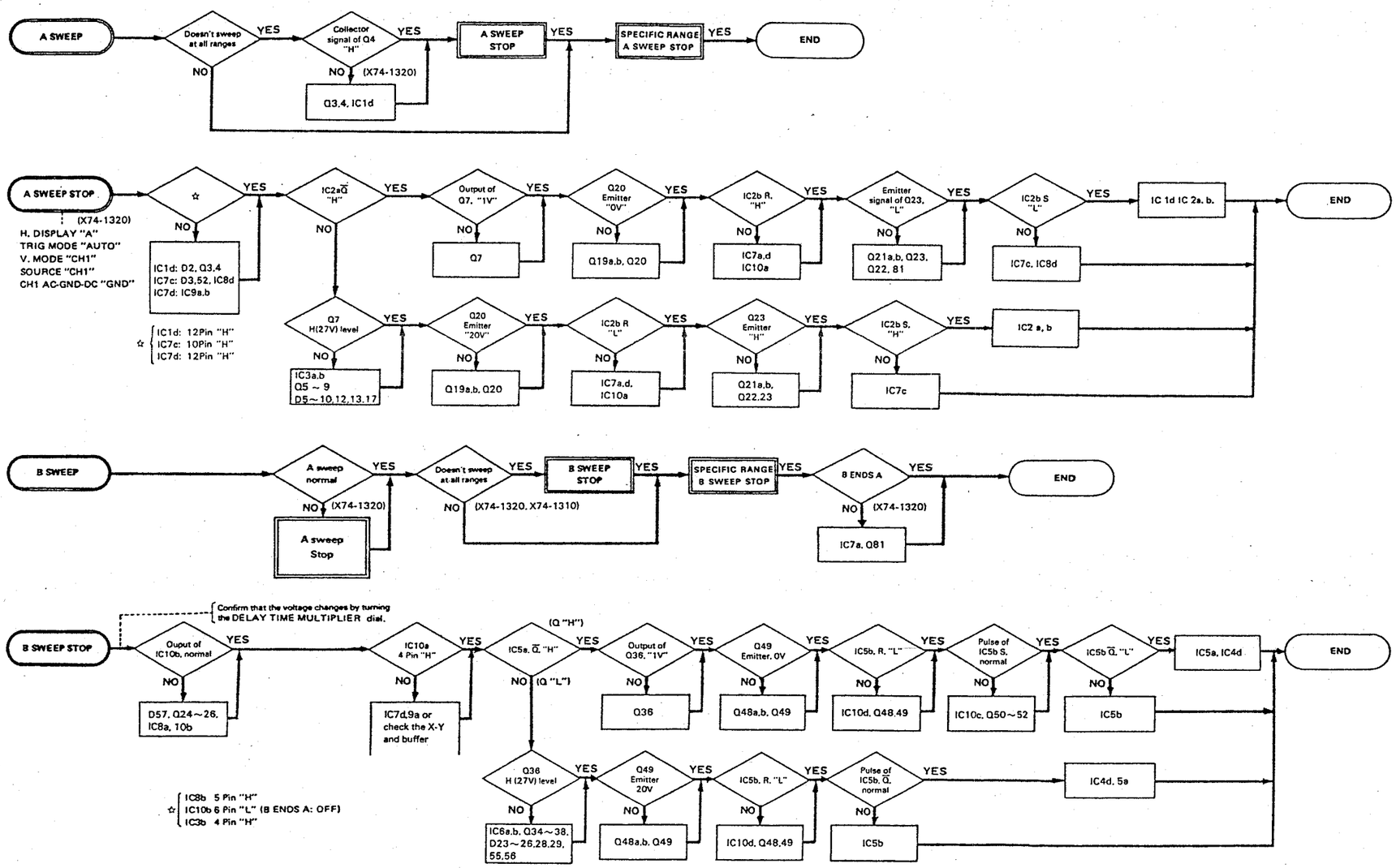

RELATIONSHIP BETWEEN A, B SWEEP AND QA, QB



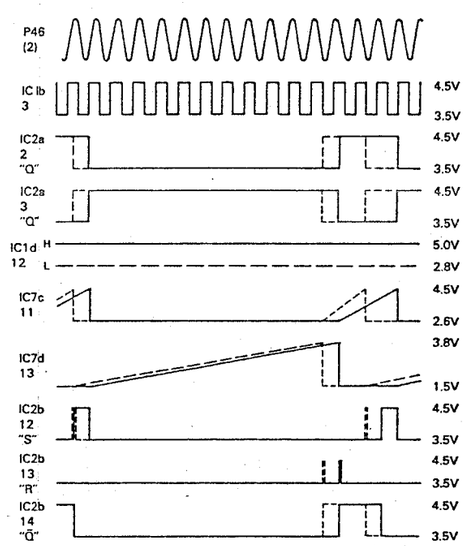




BLANKING CONTROL

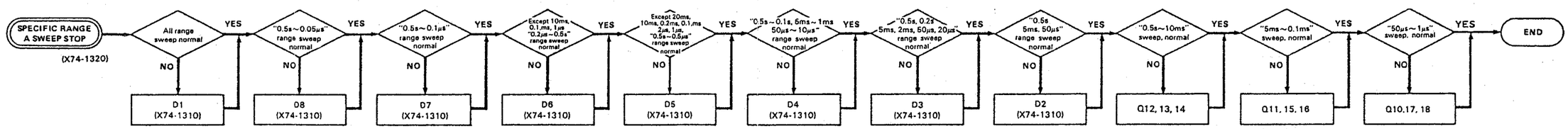
# TROUBLESHOOTING

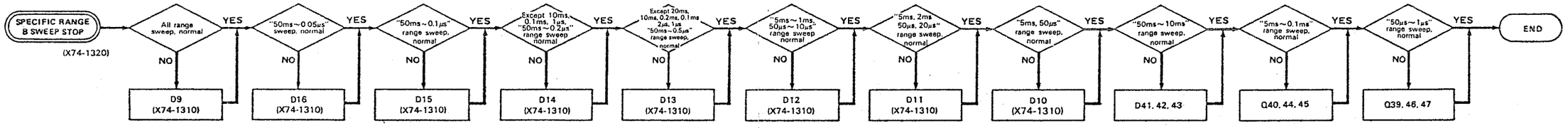


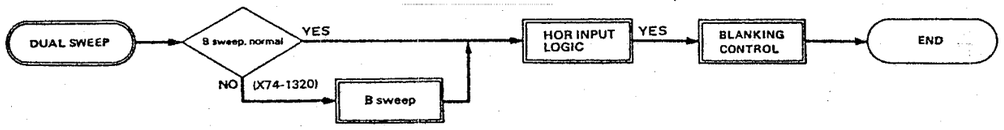

Waveform in Sweep circuit (X74-1320-00)
(Input signal 1 kHz, SWEEP TIME 1 ms/div)

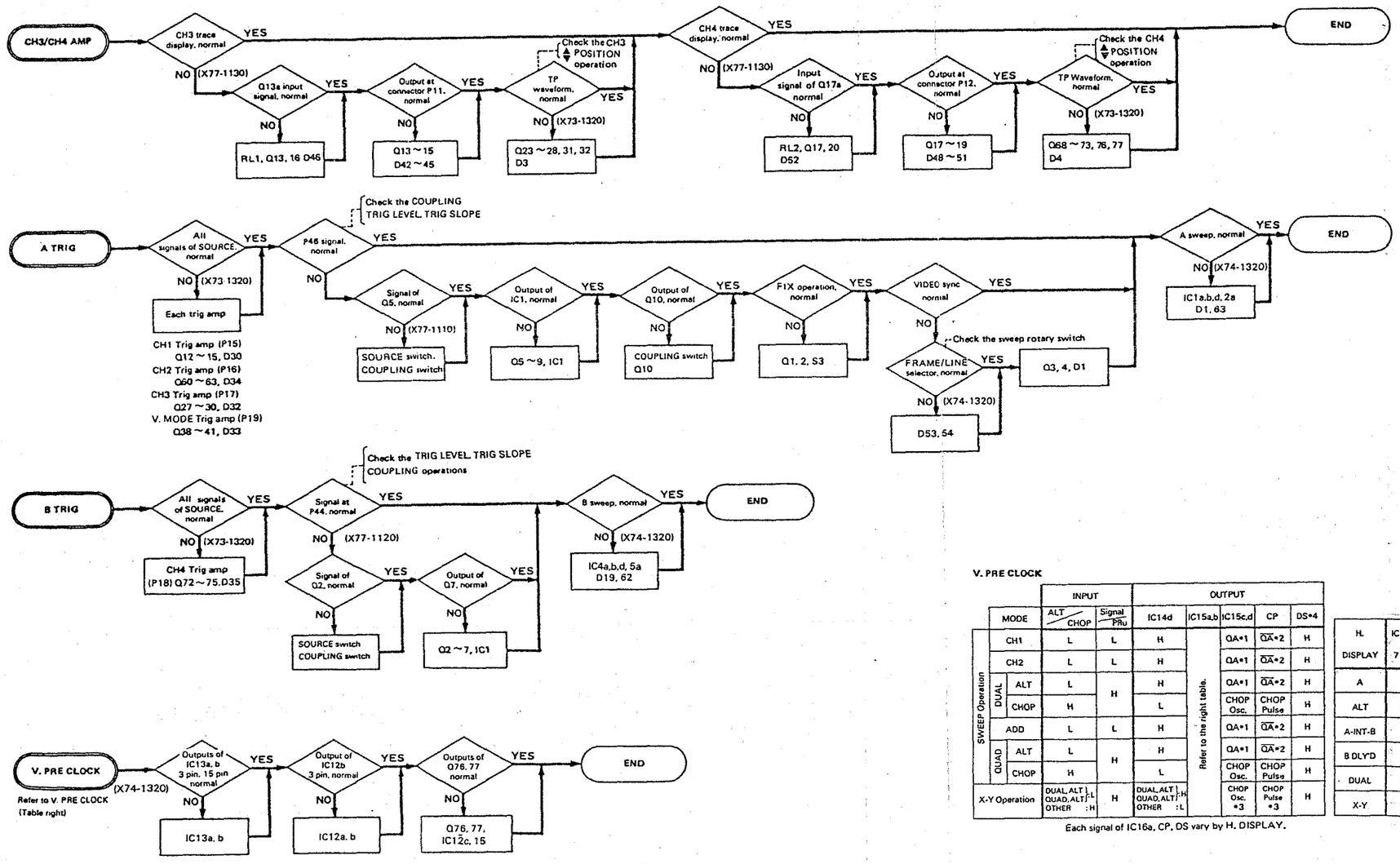



Broke-line auto free run
(at non-signal)


SPECIFIC RANGE A SWEEP STOP
(X74-1320)
All range sweep normal
YES
NO
D1 (X74-1310)
"0.5s~0.05μs" range sweep normal
D8 (X74-1310)
"0.5s~0.1μs" range sweep normal
D7 (X74-1310)
Except 10ms, 0.1ms, 1μs "0.2μs~0.5s" range sweep normal
D6 (X74-1310)
Except 20ms, 10ms, 0.2ms, 0.1ms 2μs, 1μs, "0.5s~0.5μs" range sweep normal
D5 (X74-1310)
"0.5s~0.1s, 6ms~1ms 50μs~10μs" range sweep normal
D4 (X74-1310)
"0.5s, 0.2s 5ms, 2ms, 50μs, 20μs" range sweep normal
D3 (X74-1310)
"0.5s 5ms, 50μs" range sweep normal
D2 (X74-1310)
"0.5s~10ms" sweep, normal
Q12, 13, 14
"5ms~0.1ms" sweep, normal
Q11, 15, 16
"50μs~1μs" sweep, normal
Q10,17, 18
END


SPECIFIC RANGE B SWEEP STOP
(X74-1320)
All range sweep, normal
YES
NO
D9 (X74-1310)
"50ms~0.05μs" sweep, normal
D16 (X74-1310)
"50ms~0.1μs" range sweep, normal
D15 (X74-1310)
Except 10ms, 0.1ms, 1μs "50ms~0.2μs" range sweep normal
D14 (X74-1310)
Except 20ms, 10ms, 0.2ms, 0.1ms 2μs, 1μs "50ms~0.5μs" range sweep, normal
D13 (X74-1310)
"5ms~1ms, 50μs~10μs" range sweep normal
D12 (X74-1310)
"5ms, 2ms 50μs, 20μs" range sweep, normal
D11 (X74-1310)
"5ms, 50μs" range sweep, normal
D10 (X74-1310)
"50ms~10ms" range sweep, normal
D41, 42, 43
"5ms~0.1ms" range sweep, normal
Q40, 44, 45
"50μs~1μs" range sweep, normal
Q39, 46, 47
END


DUAL SWEEP
B sweep, normal
YES
NO (X74-1320)
B sweep
HOR INPUT LOGIC
YES
BLANKING CONTROL
END



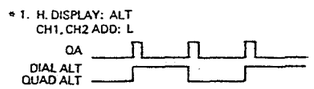

**V. PRE CLOCK**

| | MODE | INPUT ALT/CHOP | INPUT Signal/Phu | OUTPUT IC14d | OUTPUT IC15a,b | OUTPUT IC15c,d | OUTPUT CP | OUTPUT DS*4 |
|---|---|---|---|---|---|---|---|---|
| SWEEP Operation | CH1 | L | L | H | Refer to the right table. | QA*1 | $\overline{QA}$*2 | H |
| | CH2 | L | L | H | | QA*1 | $\overline{QA}$*2 | H |
| | DUAL ALT | L | H | H | | QA*1 | $\overline{QA}$*2 | H |
| | DUAL CHOP | H | H | L | | CHOP Osc. | CHOP Pulse | H |
| | ADD | L | L | H | | QA*1 | $\overline{QA}$*2 | H |
| | QUAD ALT | L | H | H | | QA*1 | $\overline{QA}$*2 | H |
| | QUAD CHOP | H | H | L | | CHOP Osc. | CHOP Pulse | H |
| X-Y Operation | | DUAL, ALT, QUAD, ALT: L; OTHER: H | H | DUAL, ALT, QUAD, ALT: H; OTHER: L | | CHOP Osc. *3 | CHOP Pulse *3 | H |

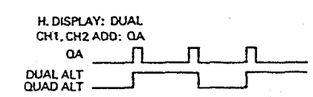
Each signal of IC16a, CP, DS vary by H. DISPLAY.

| H. DISPLAY | IC15b 7 Pin | IC15b 6 Pin | IC15a, b OUTPUT | CQ | IC13a Q |
|---|---|---|---|---|---|
| A | L | L | QA | L | H |
| ALT | H | L | L | L | *5 |
| A-INT-B | L | L | QA | L | H |
| B DLY'D | L | L | QA | L | L |
| DUAL | H | L | QA | H | *5 |
| X-Y | H | L | L | L | H |

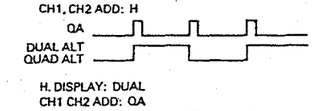
* 1. H. DISPLAY: ALT
CH1, CH2 ADD: L



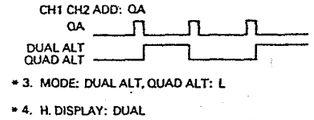

H. DISPLAY: DUAL
CH1, CH2 ADD: QA




* 2. H. DISPLAY: ALT
CH1, CH2 ADD: H



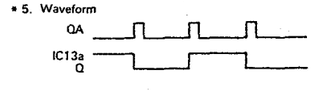

H. DISPLAY: DUAL
CH1 CH2 ADD: QA



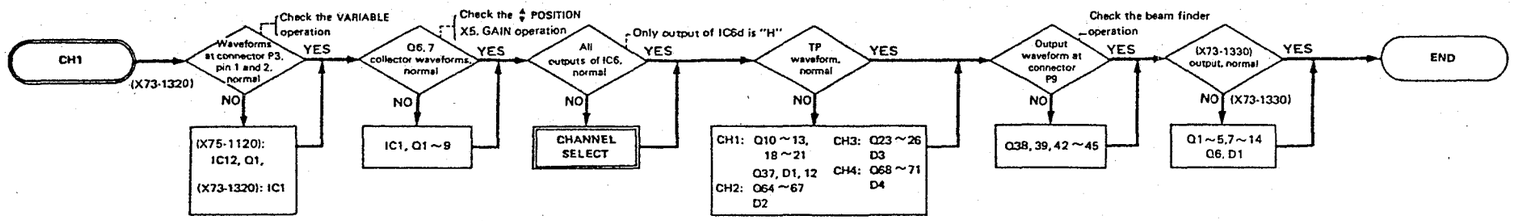

* 3. MODE: DUAL ALT, QUAD ALT: L

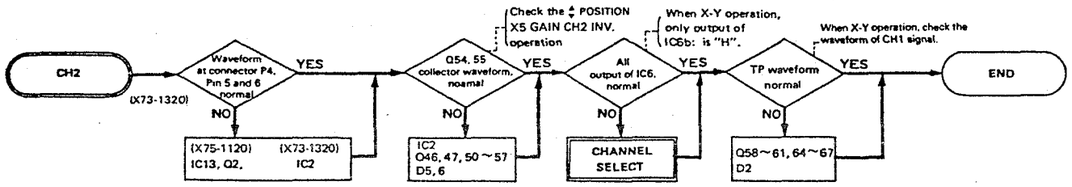
* 4. H. DISPLAY: DUAL

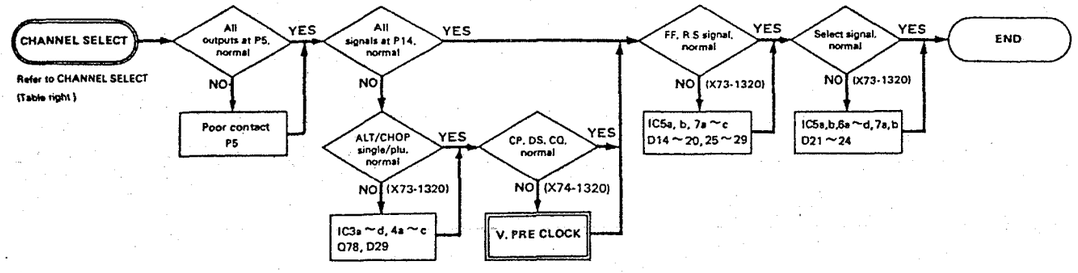
* 5. Waveform



# TROUBLESHOOTING





CH2
(X73-1320)
Waveform at connector P4, Pin 5 and 6 normal
YES
NO
(X75-1120) IC13, Q2,
(X73-1320) IC2
Q54, 55 collector waveform, noamal
Check the ▲▼ POSITION X5 GAIN CH2 INV. operation
IC2 Q46, 47, 50 ~57 D5, 6
All output of IC6, normal
When X-Y operation, only output of IC6b: is "H".
CHANNEL SELECT
TP waveform normal
When X-Y operation, check the waveform of CH1 signal.
Q58 ~61, 64 ~67 D2
END




CHANNEL SELECT

| SWEEP OPERATION | | | MODE INPUT LOG OUTPUT(PS) signal | | | | | VERTICAL CLOCK (P14) | | | | FLIP-FLOP PRESET, CLEAR signal | | | FLIP-FLOP OUTPUT signal | | | | CHANNEL SELECT signal | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CH1 | CH2 | DU AL | ADD | ALT | H.S Pwr | Single /plu | CP | DS | CO | R5b | S5b | R5a | Q5b | $\overline{Q5b}$ | Q5a | $\overline{Q5a}$ | CH1 | CH2 | CH3 | CH4 |
| | | CH1 | L | H | H | H | H | L | L | L | L | X | L | H | L | L | H | L | H | H | L | L | L |
| | | CH2 | H | L | H | H | H | L | L | L | L | X | H | L | L | H | L | L | H | L | H | L | L |
| | | ADD | H | H | H | L | H | L | L | L | L | X | L | L | L | H | H | L | H | H | H | L | L |
| Except the DUAL SWEEP | DUAL | ALT | H | H | L | H | L | H | L | H | L | L | H | H | L | TOGGLE | | L | H | Fig1 | | L | L |
| | | CHOP | | | | | H | | H | | | | | | | | | | | | | | |
| | QUAD | ALT | | | | | L | | L | | | | | | | TOGGLE | | TOGGLE | | Fig2 | | | |
| | | CHOP | | | | H | H | | H | | | | | | H | | | | | | | | |
| DUAL SWEEP | DUAL | ALT | H | H | L | H | L | H | L | H | L | L | H | H | L | TOGGLE | | L | H | Fig3 | | L | L |
| | | CHOP | | | | | H | | H | | | | | | | | | | | | | | |
| | QUAD | ALT | | | | | L | | L | | | | | | | TOGGLE | | TOGGLE | | Fig4 | | | |
| | | CHOP | | | | H | H | | H | | | | | | H | | | | | | | | |
| X-Y operation | | | X | X | X | X | X | H | H | L | L | L | H | L | L | H | L | H | L | H | L | L | L |

(Note) "X" H or L

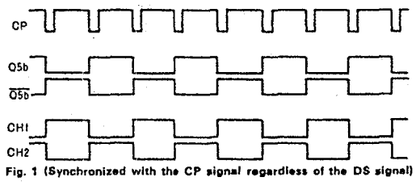



Fig. 1 (Synchronized with the CP signal regardless of the DS signal)

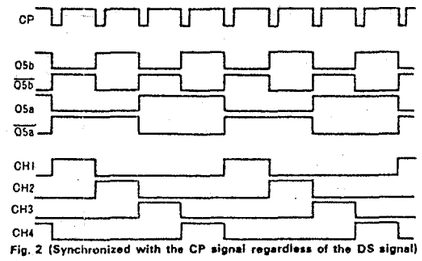



Fig. 2 (Synchronized with the CP signal regardless of the DS signal)

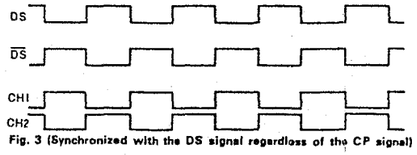



Fig. 3 (Synchronized with the DS signal regardless of the CP signal)

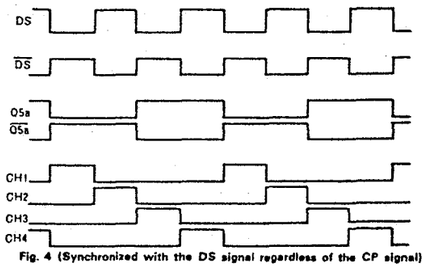



Fig. 4 (Synchronized with the DS signal regardless of the CP signal)

# PARTS LIST

Unless otherwise specified, all resistors are ± 5%, 1/6W and all capacitor's voltage ratings are 50WV.

**The specifications and parts list and schematic diagram may be changed without notice owing to a technical innovation.**

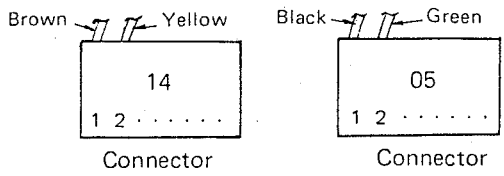
ABBREVIATIONS

| | |
|---|---|
| **Resistor** | |
| RD | Carbon |
| RN | Metal film |
| RS | Metal film |
| RC | Solid |
| MG | Metal glaze |
| VR | Variable or semi-fixed |
| **Capacitor** | |
| CC | Ceramic |
| CK | Ceramic |
| CE | Electrolytic |
| CM | Mica |
| CQ | Mylar (Polypropylen) |
| TC | Ceramic trimmer |
| MF | Metal film |
| SCC | Semiconductor ceramic |
| **Semiconductor** | |
| TR | Transistor |
| FET | Field effect transistor |

The part No. of each connector is stamped or color-coded. The color-coding is as follows.

| Black | Brown | Red | Orange | Yellow | Green | Blue | Purple | Grey | White |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

[ Example ]




Each connector can be classified by the color of pin 1 and pin 2.

CHASSIS ASSEMBLY

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | Serial No. Eff. | Remarks |
|---|---|---|---|---|---|
| 1-1 | | A13-0731-42 | Frame | | |
| 1-2 | | A13-0732-12 | Frame | | |
| 1-3 | | A20-2756-15 | Die-casting panel | | |
| 1-4 | | A21-0882-04 | Decorative panel | | |
| 1-5 | | A21-0883-04 | Decorative panel | | |
| 1-6 | | A21-0884-04 | Decorative panel | | |

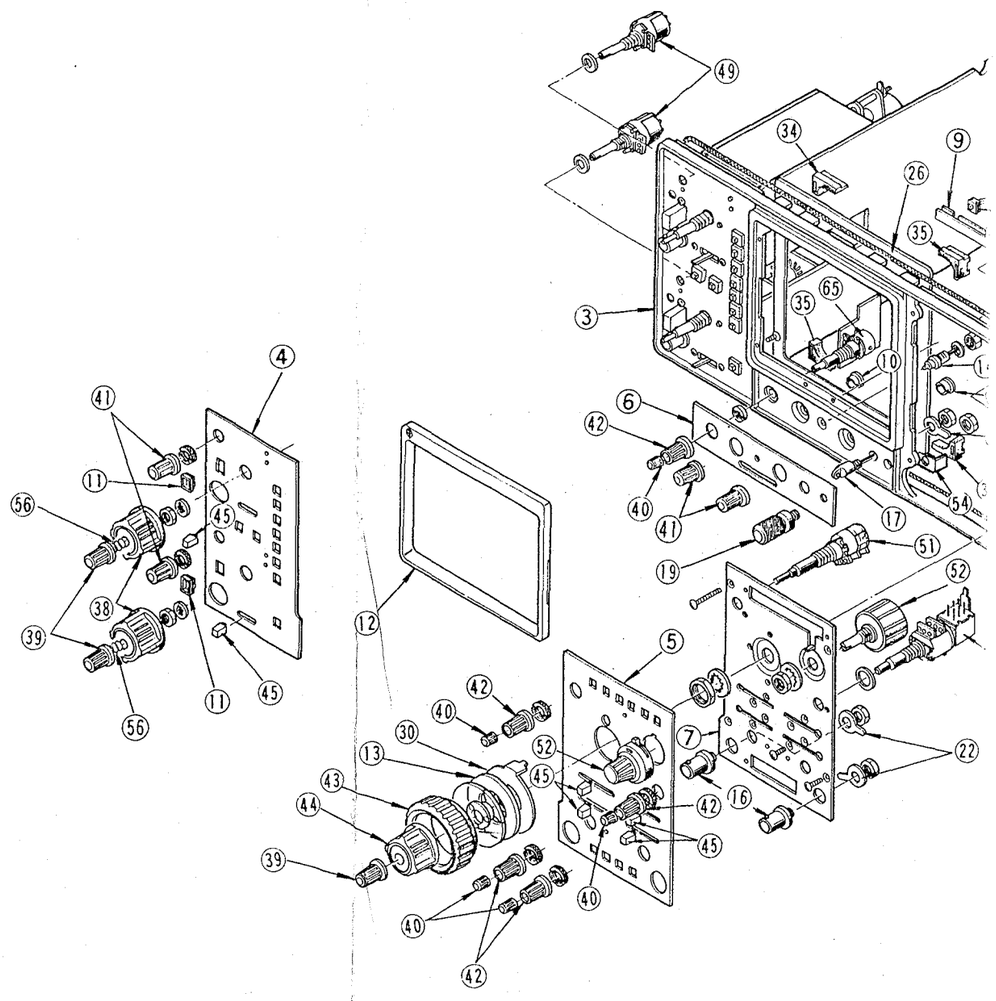
# PARTS LIST

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | Serial No. Eff. | Remarks |
|---|---|---|---|---|---|
| 1-7 | | A22-0817-33 | Sub panel | | |
| 1-8 | | A23-1627-12 | Rear panel | | |
| 1-9 | | A33-0501-14 | Reflector | | |
| 1-10 | | D23-0801-04 | Spacer | | |
| 1-11 | | B07-0706-04 | Push escutcheon | | |
| 1-12 | | B19-0713-13 | Filter | | |
| 1-13 | | B20-0919-14 | Floating core | | |
| 1-14 | | B30-0903-15 | LED | | |
| 1-15 | | E18-0351-05 | Power connector | | |
| 1-16 | | E04-0251-05 | BNC jack | | |
| 1-17 | | E21-0654-42 | CAL terminal | | |
| 1-18 | | E21-0659-15 | Coil CAL | | |
| 1-19 | | E21-0657-04 | GND terminal | | |
| 1-20 | | E29-0504-05 | Teflon terminal | | |
| 1-21 | | E23-0015-04 | Terminal lug | | |
| 1-22 | | E23-0513-05 | Earth lug | | |
| 1-23 | | E23-0520-05 | Earth lug | | |
| 1-24 | | F05-1224-05 | Fuse 1.2A | | |
| 1-25 | | F15-0138-04 | Felt | | |
| 1-26 | | F15-0716-14 | Spacer | | |
| 1-27 | | F20-0621-04 | Insulator plate | | |
| 1-28 | | J13-0038-05 | Fuse holder | | |
| 1-29 | | J19-1624-04 | Stopper | | |
| 1-30 | | J21-2927-04 | Ring-antirun | | |
| 1-31 | | J21-2871-14 | Bracket (For D.L.) | | |
| 1-32 | | J29-0505-04 | Retainer clamp | | |
| 1-33 | | J39-0506-04 | Spacer | | |
| 1-34 | | J42-0512-04 | Mounting rubber (For CRT) | | |
| 1-35 | | J42-0513-04 | Mounting rubber (For CRT) | | |
| 1-36 | | J42-0514-04 | Mounting rubber (For lamp) | | |
| 1-37 | | J61-0511-05 | Wire suddle | | |
| 1-38 | | K21-0819-03 | Knob | | |
| 1-39 | | K21-0821-14 | Knob | | |
| 1-40 | | K21-0831-24 | Knob | | |
| 1-41 | | K21-0832-14 | Knob | | |
| 1-42 | | K21-0833-14 | Knob | | |
| 1-43 | | K21-0837-24 | Knob | | |
| 1-44 | | K21-0838-93 | Knob | | |
| 1-45 | | K27-0526-04 | Lever knob | | |
| 1-46 | | L76-0104-05 | Delay line | | |
| 1-47 | S29 | S31-2004-05 | Slide switch | | |
| 1-48 | | | Power thermister 4W-25V | | |
| 1-49 | VR1 | R01-1507-05 | Variable resistor 3 kΩ | | |
| | VR2 | R01-1507-05 | Variable resistor 3 kΩ | | |
| 1-50 | VR4a | R06-2502-05 | Variable resistor 5 kΩ | | |
| | VR4b | R06-2502-05 | Variable resistor 5 kΩ | | |
| 1-51 | VR3a | R23-2501-05 | Variable resistor 5 kΩ | | |
| | VR3b | R23-2501-05 | Variable resistor 5 kΩ | | |
| 1-52 | VR5 | R29-0504-05 | Potentio meter 1 kΩ | | |
| 1-53 | | 002-0006-05 | Shield gasket | | |
| 1-54 | | F10-1553-14 | Shield plate for CH3 | | |
| 1-55 | | F10-1557-04 | Earth band | | |
| 1-56 | | G01-0906-04 | Spring | | |
| 1-57 | | J39-0509-04 | Supporter for P.C.B | | |
| 1-58 | | J25-2902-03 | Printed circuit board | | |
| 1-59 | | F11-0963-03 | Shield case for switching power block | | |
| 1-60 | | W02-0402-25 | High voltage block | | |
| 1-61 | | W02-0405-15 | Switching power block | | |
| 1-62 | | X68-1310-00 | Power blanking unit | | |
| | | J25-2972-03 | Printed circuit board | | |
| 1-63 | | R03-3502-15 | Variable resistor 10 kΩ | | |
| 1-64 | | R05-8001-05 | Variable resistor 3 MΩ | | |
| 1-65 | | R23-1501-05 | Variable resistor 1 kΩ | | |
| 1-66 | | F02-0503-04 | Heat sink | | |
| 1-67 | | J21-2930-04 | Bracket (For VR) | | |
| 1-68 | | X73-1320-00 | Vertical pre amp unit | | |

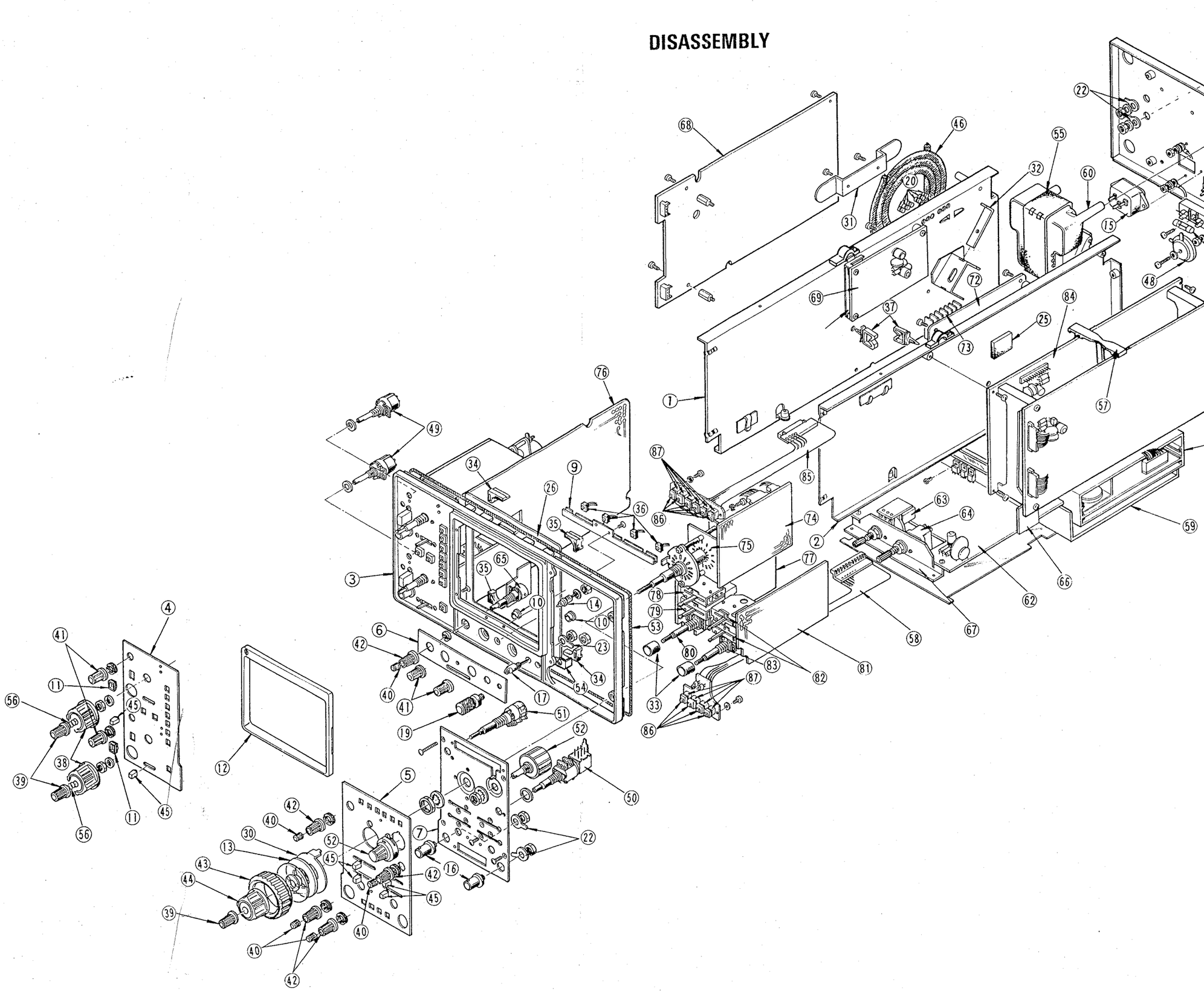
# PARTS LIST

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | Serial No. Eff. | Remarks |
|---|---|---|---|---|---|
| | | J25-2973-03 | Printed circuit board | | |
| 1-69 | | X73-1330-00 | Vertical output unit | | |
| | | J25-2974-04 | Printed circuit board | | |
| 1-70 | | F02-0501-04 | Heat sink | | |
| 1-71 | | X74-1320-00 | Trig sweep unit | | |
| | | J25-2975-03 | Printed circuit board | | |
| 1-72 | | X74-1230-02 | Horizontal output amp unit | | |
| | | J25-2976-04 | Printed circuit board | | |
| 1-73 | | F01-0827-04 | Heat sink | | |
| 1-74 | | X74-1310-00 | Sweep rotary unit | | |
| | | J25-2971-03 | Printed circuit board | | |
| 1-75 | | S02-2503-05 | Rotary switch | | |
| 1-76 | | X75-1120-00 | Vertical ATT unit | | |
| | | J25-2977-03 | Printed circuit board | | |
| 1-77 | | X77-1110-00 | A trig switch unit | | |
| | | J25-2978-04 | Printed circuit board | | |
| 1-78 | | S33-2501-05 | Lever switch | | |
| 1-79 | | S32-4008-05 | Lever switch | | |
| 1-80 | | R01-2510-05 | Variable resistor 5 kΩ | | |
| 1-81 | | X77-1120-00 | B trig switch unit | | |
| | | J25-2979-04 | Printed circuit board | | |
| 1-82 | | S37-2005-05 | Lever switch | | |
| 1-83 | | R01-2511-05 | Variable resistor 5 kΩ | | |
| 1-84 | | X77-1130-00 | Horizontal mode control unit | | |
| | | J25-2980-03 | Printed circuit board | | |
| 1-85 | | J25-2900-03 | Printed circuit board | | |
| 1-86 | | K27-0524-14 | Push knob | | |
| 1-87 | S10 | S40-1504-05 | Tact switch | | |
| | S11 | S40-1504-05 | Tact switch | | |
| | S12 | S40-1504-05 | Tact switch | | |
| | S13 | S40-1504-05 | Tact switch | | |
| | S14 | S40-1504-05 | Tact switch | | |
| | S15 | S40-1504-05 | Tact switch | | |
| | S16 | S40-1504-05 | Tact switch | | |
| | S17 | S40-1504-05 | Tact switch | | |
| | S18 | S40-1504-05 | Tact switch | | |
| | S19 | S40-1504-05 | Tact switch | | |
| | | J61-0501-05 | Supporter for P.C.B | | |
| | | N08-0609-04 | Post (Hex) | | |
| | | N10-2030-41 | Nut (Hex) M3 | | |
| | | N10-2060-46 | Nut (Hex) M6 | | |
| | | N14-0602-34 | Nut | | |
| | | N14-0609-04 | Nut | | |
| | | N16-0026-46 | Lockwasher (For M2.6) | | |
| | | N16-0030-46 | Lockwasher (For M3) | | |
| | | N17-1030-41 | Lockwasher (For M3) | | |
| | | N19-0191-05 | Washer nonmetal | | |
| | | N19-0702-04 | Flat washer | | |
| | | N19-0704-04 | Flat washer | | |
| | | N30-2608-41 | Pan-head screw M2.6 × 8 | | |
| | | N30-3006-46 | Pan-head screw M3 × 6 | | |
| | | N30-3008-41 | Pan-head screw M3 × 8 | | |
| | | N32-2606-46 | Flat-head screw M2.6 × 6 | | |
| | | N32-3006-46 | Flat-head screw M3 × 6 | | |
| | | N89-3006-46 | Screw (Tapping) 3 × 6 | | |
| | | N89-3008-46 | Screw (Tapping) 3 × 8 | | |
| | | N89-3010-46 | Screw (Tapping) 3 × 10 | | |
| | | N09-0707-05 | Flat-head screw (Tapping) (3 × 18) | | |





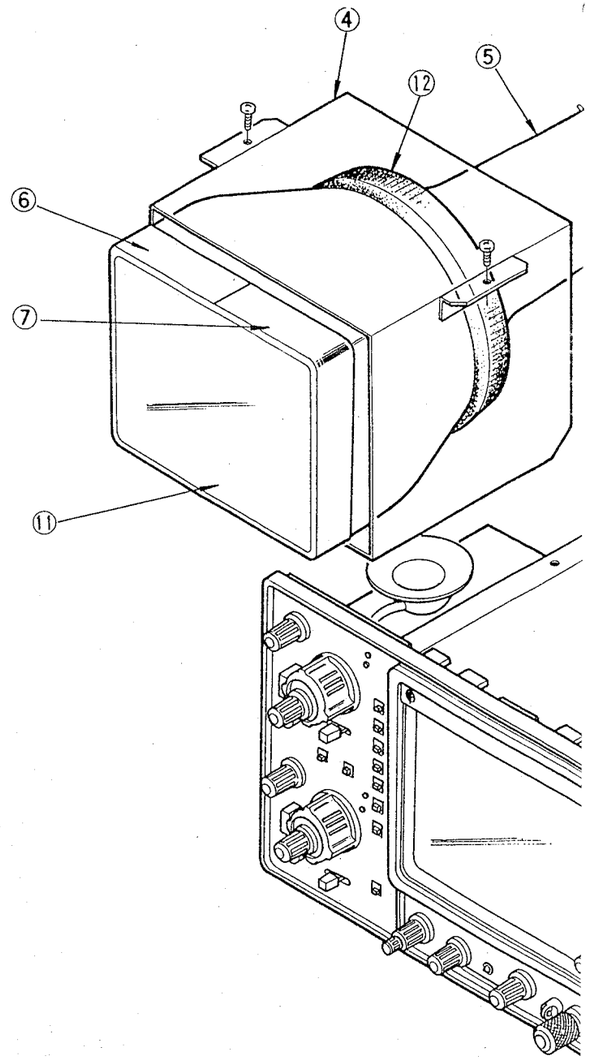
# DISASSEMBLY



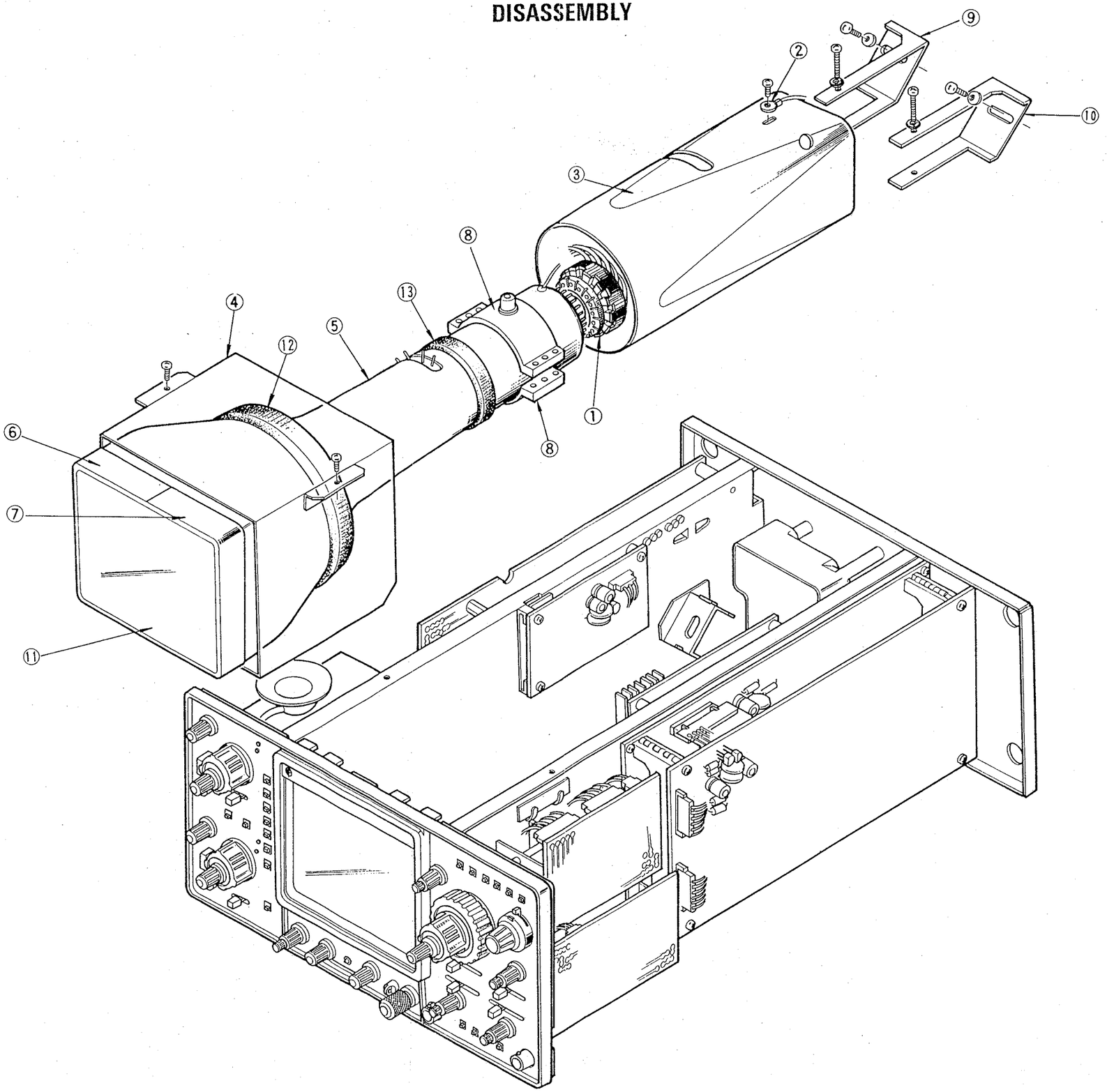
# PARTS LIST

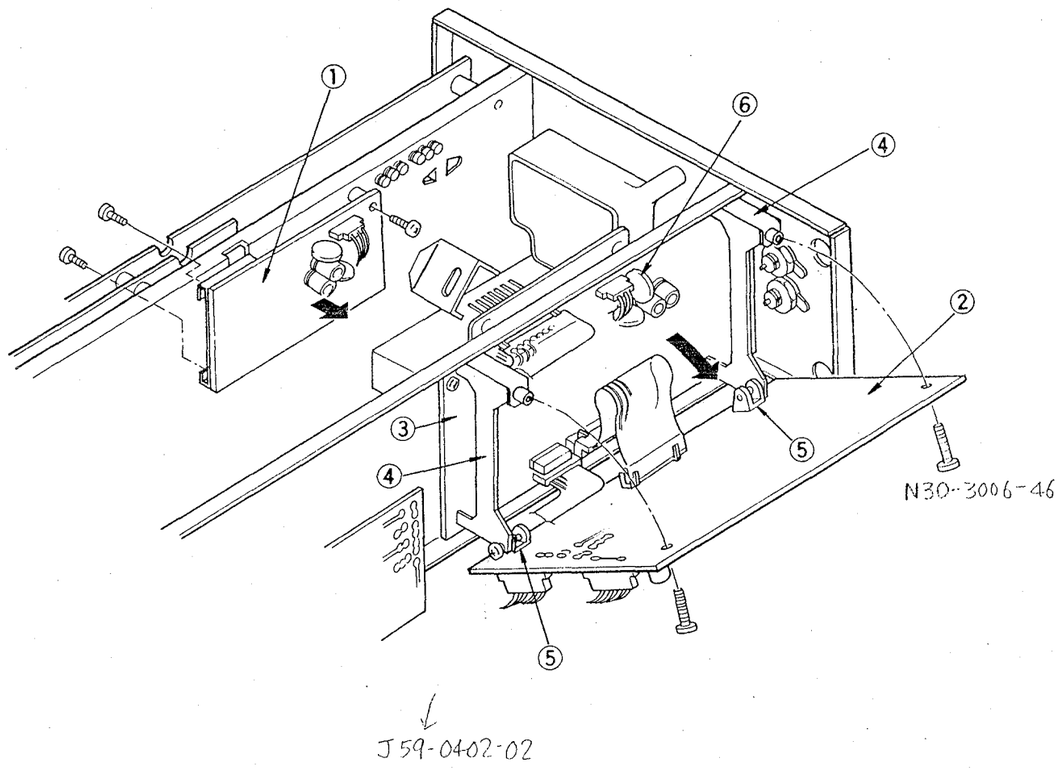
| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | Serial No. Eff. | Remarks |
|---|---|---|---|---|---|
| 3-1 | | E01-1404-05 | CRT socket | | |
| 3-2 | | E31-0564-05 | Leadwire with connector | | |
| 3-3 | | F11-0962-22 | CRT shield | | |
| 3-4 | | F11-0967-13 | CRT shield | | |
| 3-5 | | F11-0968-04 | CRT shield | | |
| 3-6 | | G16-0602-04 | Reflector sheet | | |
| 3-7 | | G16-0603-04 | Reflector sheet | | |
| 3-8 | | J19-1623-04 | CRT band | | |
| 3-9 | | J21-2925-03 | Bracket (For CRT) | | |
| 3-10 | | J21-2926-03 | Bracket (For CRT) | | |
| 3-11 | | | CRT 150ATM31A | | |
| 3-12 | | L39-0515-05 | Rotator coil | | |
| 3-13 | | L39-0514-15 | Y align coil | | |
| | | N15-1040-46 | Lockwasher | | |
| | | N16-0030-46 | Lockwasher | | |
| | | N30-3035-46 | Pan-head screw 3 × 35 | | |
| | | N30-4008-46 | Pan-head screw M4 × 8 | | |
| | | N89-3006-46 | Screw (Tapping) 3 × 6 | | |
| | | N89-3010-41 | Screw (Tapping) 3 × 10 | | |





# DISASSEMBLY

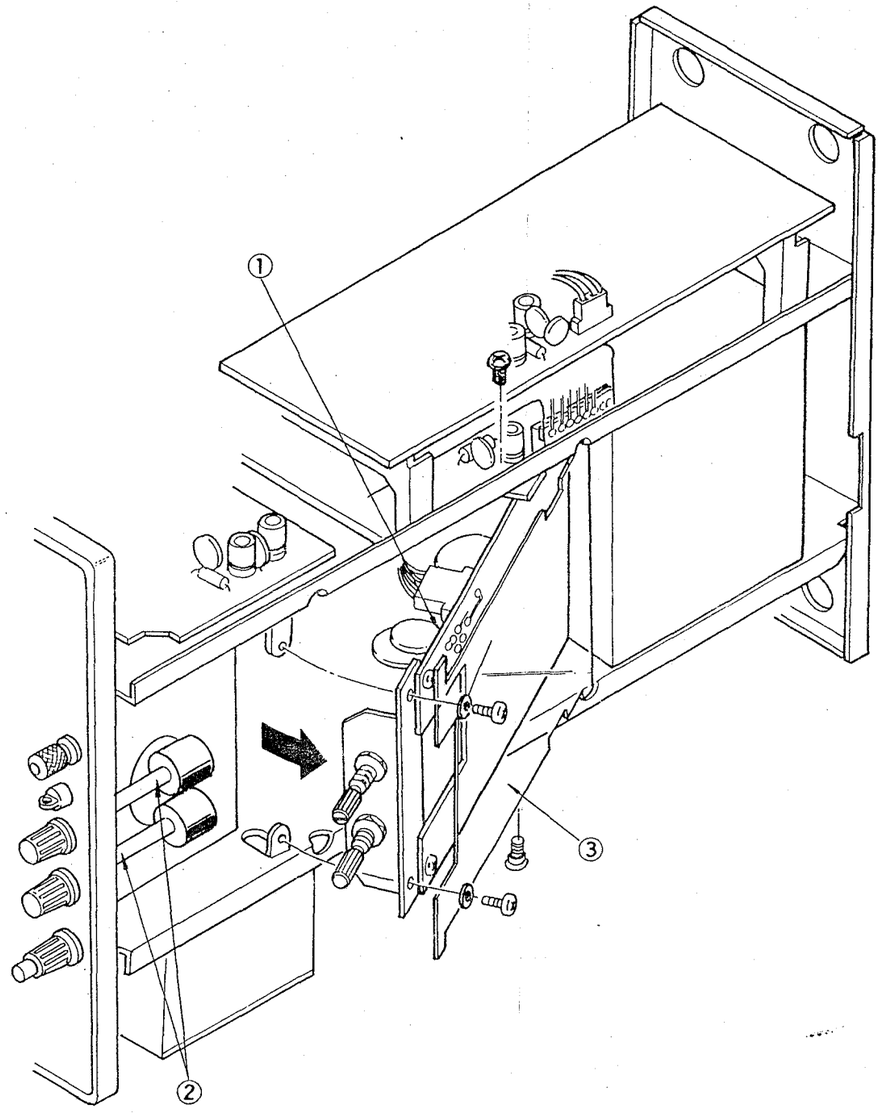





| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | Serial No. Eff. | Remarks |
|---|---|---|---|---|---|
| 4-1 | | X73-1330-00 | Vertical output unit | | |
| | | J25-2974-04 | Printed circuit board | | |
| 4-2 | | X74-1320-00 | Trig sweep unit | | |
| | | J25-2975-03 | *Printed circuit board* | | |
| 4-3 | | X77-1130-00 | Horizontal mode control unit | | |
| | | J25-2980-03 | Printed circuit board | | |
| 4-4 | | J21-2904-24 | Bracket (For P.C.B.) | | |
| 4-5 | | J21-2952-04 | Bracket (For P.C.B.) | | |
| 4-6 | | W09-0016-05 | Lithum battery | | |
| | | N09-0402-05 | Screw | | |
| | | N30-3006-46 | Pan-head screw M3 × 6 | | |

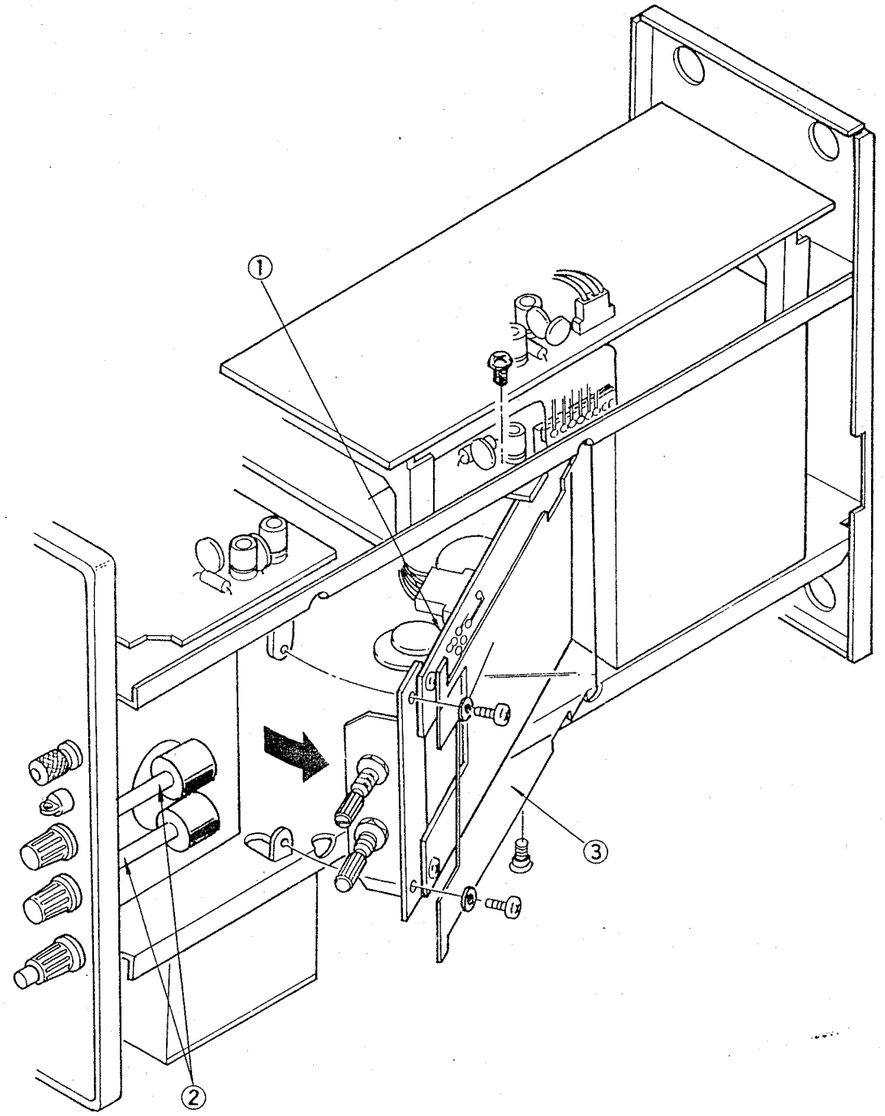


DISASSEMBLY / PARTS LIST




| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | Serial No. Eff. | Remarks |
|---|---|---|---|---|---|
| 5-1 | | X68-1310-00 | Power blanking unit | | |
| | | J25-2972-03 | Printed circuit board | | |
| 5-2 | | D21-0903-14 | Extension shaft | | |
| 5-3 | | F20-0624-04 | Insulator | | |
| | | N16-0030-46 | Lockwasher | | |
| | | N30-3006-46 | Pan-head screw M3 × 8 | | |
| | | N89-3006-46 | Screw (Tapping) 3 × 6 | | |
| | | N09-0402-05 | Screw | | |

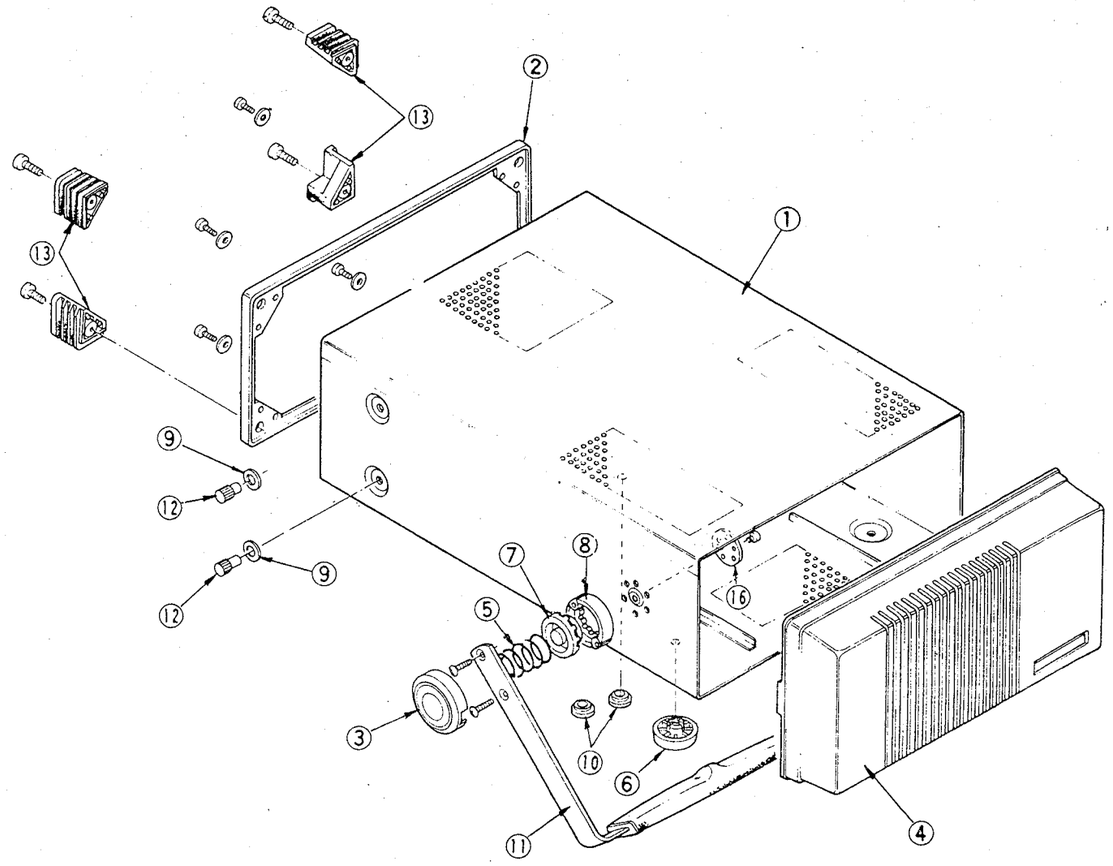
## DISASSEMBLY / PARTS LIST




| Fig. & dex No. | Ref. No. | Parts No. | Name & Description | Serial No. Eff. | Remarks |
|---|---|---|---|---|---|
| 1 | | X68-1310-00 | Power blanking unit | | |
| | | J25-2972-03 | Printed circuit board | | |
| 2 | | D21-0903-14 | Extension shaft | | |
| 3 | | F20-0624-04 | Insulator | | |
| | | N16-0030-46 | Lockwasher | | |
| | | N30-3006-46 | Pan-head screw M3 × 8 | | |
| | | N89-3006-46 | Screw (Tapping) 3 × 6 | | |
| | | N09-0402-05 | Screw | | |

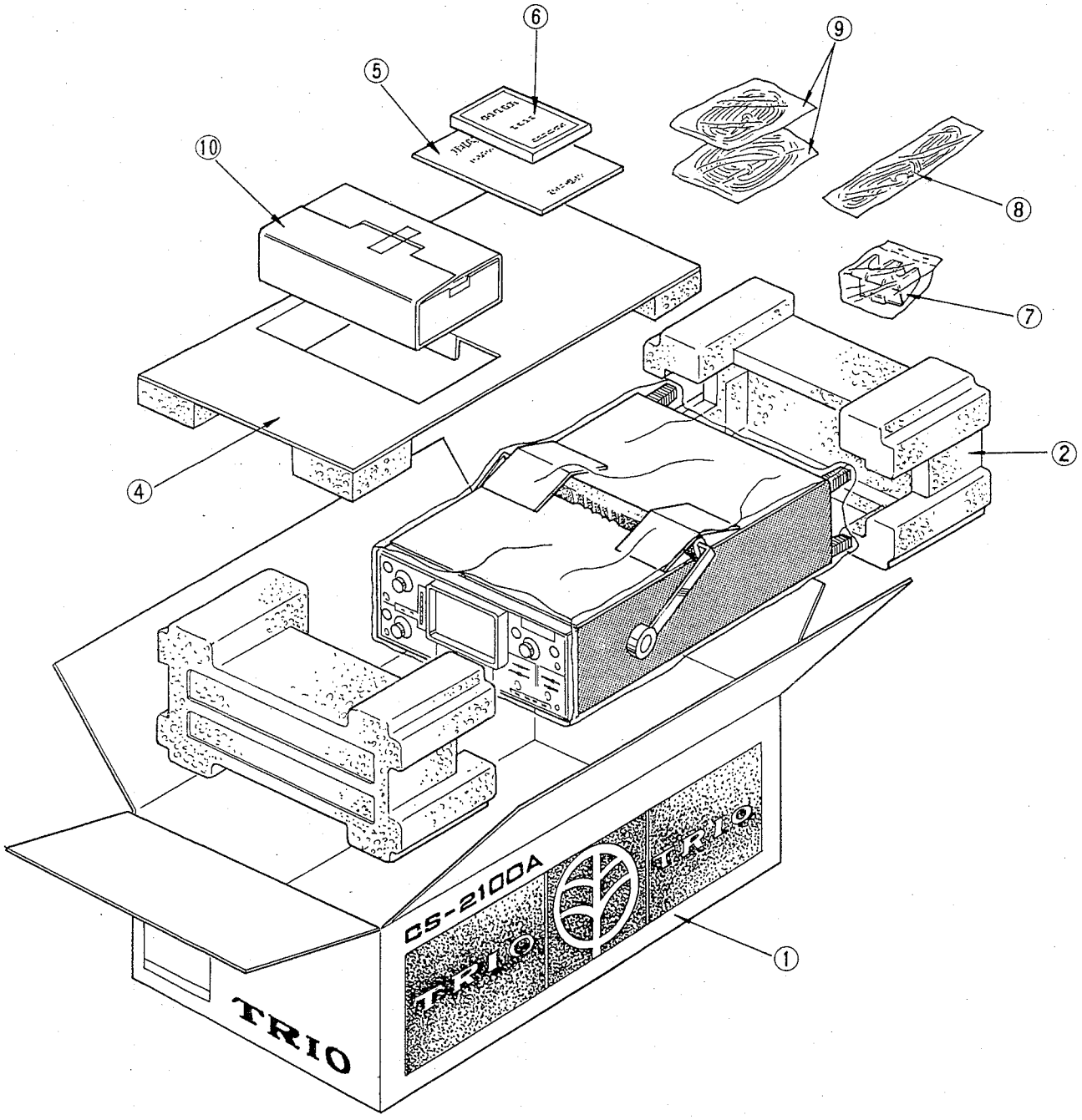


## DISASSEMBLY / PARTS LIST




| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | Serial No. Eff. | Remarks |
|---|---|---|---|---|---|
| 6-1 | | A01-0872-22 | Case | | |
| 6-2 | | B07-0710-02 | Rear escutcheon | | |
| 6-3 | | F07-0908-14 | Handle cover | | |
| 6-4 | | F07-0918-02 | Panel cover | | |
| 6-5 | | G02-0606-14 | Spring (For handle) | | |
| 6-6 | | J02-0507-05 | Rubber leg | | |
| 6-7 | | J21-2906-05 | Gear | | |
| 6-8 | | J21-2907-05 | Ring | | |
| 6-9 | | J39-0505-04 | Spacer | | |
| 6-10 | | J42-0038-04 | Bushing | | |
| 6-11 | | K01-0512-05 | Handle | | |
| 6-12 | | K23-0802-14 | Knob | | |
| 6-13 | | W01-0503-04 | Cord wrap | | |
| | | N09-0705-05 | Hex socket Flat-head screw | | |
| | | N17-1030-41 | Lock washer | | |
| | | N19-0710-05 | Washer | | |
| | | N30-3008-41 | Pan-head screw M3 × 8 | | |
| | | N30-4018-41 | Pan-head screw M4 × 18 | | |

# DISASSEMBLY / PARTS LIST




| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | Serial No. Eff. | Remarks |
|---|---|---|---|---|---|
| 7-1 | | H01-2922-14 | Carton box | | |
| 7-2 | | H10-2812-12 | Pad (Formed styrene) | | |
| 7-3 | | H20-1713-14 | Polyethylene bag | | |
| 7-4 | | H12-0536-03 | Pad (Carton) | | |
| 7-5 | | B50-2932-10 | Instruction manual | | |
| 7-6 | | B50-2942-10 | Instruction hand book | | |
| 7-7 | | J21-2903-03 | Probe holder | | |
| 7-8 | | E30-1818-05 | Power cord (JIS) | | |
| | | E30-1819-05 | Power cord (CEE) | | |
| | | E30-1821-05 | Power cord (SAA) | | |
| 7-9 | | Y87-1250-00 | Probe (PC-29) | | |
| 7-10 | | H12-0535-03 | Pad (Carton) | | |

# PARTS LIST

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | Serial No. Eff. | Remarks |
|---|---|---|---|---|---|
| | | | Thermister 4W-25V | | |
| | R1 | RN14BK2H50ROF | Metal film resistor, 50Ω, ±1%, 1/2W | | |
| | R2 | RN14BK2H50ROF | Metal film resistor, 50Ω, ±1%, 1/2W | | |
| | R3 | RD14BB2E105J | Carbon resistor, 1MΩ, ±5%, 1/4W | | |
| | R4 | RD14BB2E105J | Carbon resistor, 1MΩ, ±5%, 1/4W | | |
| | R5 | RD14BB2E220J | Carbon resistor, 22Ω, ±5%, 1/4W | | |
| | R6 | RD14BB2E220J | Carbon resistor, 22Ω, ±5%, 1/4W | | |
| | R7 | RD14BB2E220J | Carbon resistor, 22Ω, ±5%, 1/4W | | |
| | R8 | RD14BB2E220J | Carbon resistor, 22Ω, ±5%, 1/4W | | |
| | R9 | RD14BB2B220J | Carbon resistor, 22Ω, ±5%, 1/8W | | |
| | R10 | RD14BB2B220J | Carbon resistor, 22Ω, ±5%, 1/8W | | |
| | C1 | C91-0501-05 | Metal film capacitor, 0.047μF, 630 WV | | |
| | C2 | C91-0501-05 | Metal film capacitor, 0.047μF, 630 WV | | |
| | C4 | CK45E3D472P | Ceramic capacitor, 4700pF, 2000 WV | | |
| | C5 | CK45E3D472P | Ceramic capacitor, 4700pF, 2000 WV | | |
| | C6 | CC45CH1H101J | Ceramic capacitor 100pF, ±5% | | |
| | C7 | CC45CH1H030C | Ceramic capacitor, 3pF, ±0.25pF | | |
| | C8 | CC45CH1H680J | Ceramic capacitor, 68pF, ±5% | | |
| | C9 | CC45CH1H680J | Ceramic capacitor, 68pF, ±5% | | |
| | C10 | C91-0551-05 | Metal film capacitor, 0.22μF, 600 WV | | |
| | | B40-2765-04 | Name plate | | |
| | | B41-0730-04 | Caution sheet | | |
| | | B41-0739-04 | Caution sheet | | |
| | | B42-1835-04 | Voltage indication sheet | | |
| | | B42-1836-04 | Voltage indication sheet | | |
| | | E31-2322-05 | Leadwire with connector | | |
| | J7 | E31-0748-15 | Leadwire with connector | | |
| | J8 | E31-0749-15 | Leadwire with connector | | |
| | J9 | E31-0750-15 | Leadwire with connector | | |
| | J10 | E31-0751-25 | Leadwire with connector | | |
| | J11 | E31-0797-05 | Leadwire with connector | | |
| | J12 | E31-0797-05 | Leadwire with connector | | |
| | J15 | E31-2340-05 | Leadwire with connector | | |
| | J31 | E31-0752-05 | Leadwire with connector | | |
| | J32 | E31-0753-05 | Leadwire with connector | | |
| | J33 | E31-0754-05 | Leadwire with connector | | |
| | J40 | E31-2337-05 | Leadwire with connector | | |
| | J41 | E31-2338-05 | Leadwire with connector | | |
| | J48 | E31-2339-05 | Leadwire with connector | | |
| | J51 | E31-2341-05 | Leadwire with connector | | |
| | J56 | E31-0790-15 | Leadwire with connector | | |
| | J57 | E31-0799-15 | Leadwire with connector | | |
| | | E31-0756-05 | Leadwire with connector | | |
| | | E31-0564-05 | Leadwire with connector | | |
| | | E31-0759-45 | Wire harness | | |
| | | E40-0711-05 | Pin connector 7P | | |
| | | E40-1811-05 | Pin connector 18P | | |
| | | E40-1216-05 | Pin connector 12P | | |
| | | E40-1516-05 | Pin connector 15P | | |
| | | F11-0963-03 | Shield case | | |
| | | L92-0103-05 | Ferrite core | | |
| | | J19-1620-05 | Cord keeper | | |
| | | J61-0501-05 | Supporter (For P.C.B.) | | |
| | | J59-0520-05 | Edging | | |
| | | J59-0420-05 | Nylon rivet | | |
| | | J61-0049-05 | Cable band | | |

# PARTS LIST

## VERTICAL ATTENUATOR UNIT X75-1120-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| | R1 | RD14BB2C470J | RD | 47Ω | | |
| | R2 | RD14BB2C100J | RD | 10Ω | | |
| | R3 | RD14BB2C220J | RD | 22Ω | | |
| B-2 | R4 | RN14BK2E5003F | RN | 500kΩ | ±1% | 1/4W |
| B-2 | R5 | RN14BK2E1004F | RN | 1MΩ | ±1% | 1/4W |
| B-3 | R6 | RD14BB2C560J | RD | 56Ω | | |
| B-3 | R7 | RN14BK2E7503F | RN | 750kΩ | ±1% | 1/4W |
| B-3 | R8 | R92-0795-05 | RD | 333kΩ | ±1% | 1/2W |
| B-3 | R9 | RD14BB2C220J | RD | 22Ω | | |
| A-3 | R10 | RN14BK2E9003F | RN | 900kΩ | ±1% | 1/4W |
| A-2 | R11 | RN14BK2E1113F | RN | 111kΩ | ±1% | 1/4W |
| A-3 | R12 | RD14BB2C680J | RD | 68Ω | | |
| A-3 | R13 | RD14BB2C100J | RD | 10Ω | | |
| A-3 | R14 | RD14BB2C470J | RD | 47Ω | | |
| B-3 | R15 | RD14BB2C472J | RD | 4.7kΩ | | |
| C-2 | R16 | RD14BB2C472J | RD | 4.7kΩ | | |
| B-2 | R17 | RD14BB2C912J | RD | 9.1kΩ | | |
| B-2 | R18 | RD14BB2C470J | RD | 47Ω | | |
| C-3 | R19 | RD14BB2C181J | RD | 180Ω | | |
| B-3 | R20 | RN14BK2E9903F | RN | 990kΩ | ±1% | 1/4W |
| B-3 | R21 | RN14BK2E1012F | RN | 10.1kΩ | ±1% | 1/4W |
| B-3 | R22 | RN14BB2C101J | RD | 100Ω | | |
| B-3 | R23 | RD14BB2C220J | RD | 22Ω | | |
| B-3 | R24 | RD14BB2C820J | RD | 82Ω | | |
| B-3 | R25 | RD14BB2C122J | RD | 1.2kΩ | | |
| B-3 | R26 | RN14BK2E1004F | RN | 1MΩ | ±1% | 1/4W |
| B-3 | R27 | RD14BB2E104J | RD | 100kΩ | ±5% | 1/4W |
| C-2 | R28 | RN14BK2B1000F | RN | 100Ω | ±1% | 1/8W |
| C-3 | R29 | RN14BK2B1000F | RN | 100Ω | ±1% | 1/8W |
| C-3 | R30 | RD14BB2C101J | RD | 100Ω | | |
| C-2 | R31 | RD14BB2C101J | RD | 100Ω | | |
| C-3 | R32 | RN14BK2B7500F | RN | 750Ω | ±1% | 1/8W |
| C-3 | R33 | RN14BK2B7500F | RN | 750Ω | ±1% | 1/8W |
| C-3 | R34 | RN14BK2B7500F | RN | 750Ω | ±1% | 1/8W |
| C-3 | R35 | RN14BK2B3300F | RN | 330Ω | ±1% | 1/8W |
| | R36 | No use | | | | |
| | R37 | No use | | | | |
| | R38 | No use | | | | |
| | R39 | No use | | | | |
| | R40 | No use | | | | |
| | R41 | No use | | | | |
| C-3 | R42 | RD14BB2C121J | RD | 120Ω | | |
| | R43 | RD14BB2C470J | RD | 47Ω | | |
| | R44 | RD14BB2C100J | RD | 10Ω | | |
| | R45 | RD14BB2C220J | RD | 22Ω | | |
| B-1 | R46 | RN14BK2E5003F | RN | 500kΩ | ±1% | 1/4W |
| B-1 | R47 | RN14BK2E1004F | RN | 1MΩ | ±1% | 1/4W |
| B-1 | R48 | RD14BB2C560J | RD | 56Ω | | |
| B-1 | R49 | RN14BK2E7503F | RN | 750kΩ | ±1% | 1/4W |
| B-2 | R50 | R92-0795-05 | RD | 333kΩ | ±1% | 1/2W |
| B-1 | R51 | RD14BB2C220J | RD | 22Ω | | |
| A-1 | R52 | RN14BK2E9003F | RN | 900kΩ | ±1% | 1/4W |
| A-1 | R53 | RN14BK2E1113F | RN | 111kΩ | ±1% | 1/4W |
| A-1 | R54 | RD14BB2C680J | RD | 68Ω | | |
| A-1 | R55 | RD14BB2C100J | RD | 10Ω | | |
| A-1 | R56 | RD14BB2C220J | RD | 22Ω | | |
| C-1 | R57 | RD14BB2C181J | RD | 180Ω | | |
| B-1 | R58 | RD14BB2C912J | RD | 9.1kΩ | | |
| B-1 | R59 | RD14BB2C470J | RD | 47Ω | | |
| C-1 | R60 | RD14BB2C472J | RD | 4.7kΩ | | |
| D-1 | R61 | RD14BB2C472J | RD | 4.7kΩ | | |
| B-1 | R62 | RN14BK2E9903F | RN | 990kΩ | ±1% | 1/4W |
| B-2 | R63 | RN14BK2E1012F | RN | 10.1kΩ | ±1% | 1/4W |
| B-1 | R64 | RD14BB2C101J | RD | 100Ω | | |
| B-2 | R65 | RD14BB2C220J | RD | 22Ω | | |

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| B-1 | R66 | RD14BB2C820J | RD | 82Ω | | |
| B-1 | R67 | RD14BB2C122J | RD | 1.2kΩ | | |
| B-1 | R68 | RN14BK2E1004F | RN | 1MΩ | ±1% | 1/4W |
| B-1 | R69 | RD14BB2E104J | RN | 100Ω | ±1% | 1/8W |
| C-1 | R70 | RN14BK2B1000F | RN | 100Ω | ±1% | 1/8W |
| C-1 | R71 | RN14BK2B1000F | RN | 100Ω | ±1% | 1/8W |
| C-1 | R72 | RD14BB2C101J | RD | 100Ω | | |
| C-1 | R73 | RD14BB2C101J | RD | 100Ω | | |
| C-2 | R74 | RN14BK2B7500F | RN | 750Ω | ±1% | 1/8W |
| C-1 | R75 | RN14BK2B7500F | RN | 750Ω | ±1% | 1/8W |
| C-2 | R76 | RN14BK2B7500F | RN | 750Ω | ±1% | 1/8W |
| C-2 | R77 | RN14BK2B3300F | RN | 330Ω | ±1% | 1/8W |
| | R78 | No use | | | | |
| | R79 | No use | | | | |
| | R80 | No use | | | | |
| | R81 | No use | | | | |
| | R82 | No use | | | | |
| | R83 | No use | | | | |
| C-2 | R84 | RD14BBsC121J | RD | 120Ω | | |
| D-3 | R85 | RD14BB2C224J | RD | 220kΩ | | |
| D-3 | R86 | RD14BB2C224J | RD | 220kΩ | | |
| D-3 | R87 | RD14BB2C224J | RD | 220kΩ | | |
| D-3 | R88 | RD14BB2C224J | RD | 220kΩ | | |
| D-3 | R89 | RD14BB2C224J | RD | 220kΩ | | |
| E-3 | R90 | RD14BB2C224J | RD | 220kΩ | | |
| D-3 | R91 | RD14BB2C224J | RD | 220kΩ | | |
| D-2 | R92 | RD14BB2C224J | RD | 220kΩ | | |
| B-2 | R93 | RD14BB2C224J | RD | 220kΩ | | |
| D-3 | R94 | RD14BB2C824J | RD | 820kΩ | | |
| D-3 | R95 | RD14BB2C824J | RD | 820kΩ | | |
| D-3 | R96 | RD14BB2C824J | RD | 820kΩ | | |
| D-3 | R97 | RD14BB2C824J | RD | 820kΩ | | |
| D-3 | R98 | RD14BB2C824J | RD | 820kΩ | | |
| D-3 | R99 | RD14BB2C824J | RD | 820kΩ | | |
| D-3 | R100 | RD14BB2C824J | RD | 820kΩ | | |
| D-1 | R101 | RD14BB2C824J | RD | 820kΩ | | |
| D-2 | R102 | RD14BB2C824J | RD | 820kΩ | | |
| E-2 | R103 | RD14BB2C473J | RD | 47kΩ | | |
| E-2 | R104 | RD14BB2C473J | RD | 47kΩ | | |
| E-2 | R105 | RD14BB2C274J | RD | 270kΩ | | |
| E-2 | R106 | RD14BB2C274J | RD | 270kΩ | | |
| E-2 | R107 | RD14BB2C274J | RD | 270kΩ | | |
| E-2 | R108 | RD14BB2C473J | RD | 47kΩ | | |
| E-2 | R109 | RD14BB2C473J | RD | 47kΩ | | |
| D-2 | R110 | RD14BB2C473J | RD | 47kΩ | | |
| D-1 | R111 | RD14BB2C393J | RD | 39kΩ | | |
| D-3 | R112 | RD14BB2C391J | RD | 390Ω | | |
| D-3 | R113 | RD14BB2C391J | RD | 390Ω | | |
| D-3 | R114 | RD14BB2C391J | RD | 390Ω | | |
| D-3 | R115 | RD14BB2C391J | RD | 390Ω | | |
| D-3 | R116 | RD14BB2C391J | RD | 390Ω | | |
| D-3 | R117 | RD14BB2C391J | RD | 390Ω | | |
| D-3 | R118 | RD14BB2C391J | RD | 390Ω | | |
| D-1 | R119 | RD14BB2C391J | RD | 390Ω | | |
| D-1 | R120 | RD14BB2C391J | RD | 390Ω | | |
| D-3 | R121 | RD14BB2C391J | RD | 390Ω | | |
| D-1 | R122 | RD14BB2C391J | RD | 390Ω | | |
| D-2 | R123 | RD14BB2C100J | RD | 10Ω | | |
| | R124 | RD14BB2C680J | RD | 68Ω | | |
| C-3 | R125 | RN14BK2B1000F | RN | 100Ω | ±1% | 1/8W |
| | R126 | No use | | | | |
| A-1 | R127 | RD14BB2C101J | RD | 100Ω | | |
| C-1 | R128 | RN14BK2B1000F | RN | 100Ω | ±1% | 1/8W |
| E-1 | R129 | RD14BB2C153J | RD | 15kΩ | | |
| E-2 | R130 | RD14BB2C824J | RD | 820kΩ | | |

# PARTS LIST

X75-1120-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| E-1 | R131 | RD14BB2C824J | RD | 820kΩ | | |
| | R132 | No use | | | | |
| C-1 | R133 | RN14BK2B47ROF | RN | 47Ω | ±1% | 1/8W |
| C-3 | R134 | RN14BK2B47ROF | RN | 47Ω | ±1% | 1/8W |
| | R135 | RD14BB2C680J | RD | 68Ω | | |
| C-2 | R136 | RN14BK2B47ROF | RN | 47Ω | ±1% | 1/8W |
| A-3 | R137 | RD14BB2C101J | RD | 100Ω | | |
| C-3 | R138 | RN14BK2B47ROF | RN | 47Ω | ±1% | 1/8W |
| A-3 | R139 | RD14BB2C220J | RD | 22Ω | | |
| A-1 | R140 | RD14BB2C220J | RD | 22Ω | | |
| E-2 | R141 | RD14BB2C824J | RD | 820kΩ | | |
| | R142 | RD14BB2C100J | RD | 10Ω | | |
| C-2 | R143 | RD14BB2C100J | RD | 10Ω | | |
| | R144 | RD14BB2C101J | RD | 100Ω | | |
| | R145 | RD14BB2C101J | RD | 100Ω | | |
| C-3 | VR1 | R12-0421-05 | VR | 100Ω | | |
| C-2 | VR2 | R12-0421-05 | VR | 100Ω | | |
| | C1 | CC45CH1H470J | CC | 47pF | ±5% | |
| | C2 | CC45CH1H470J | CC | 47pF | ±5% | |
| | C3 | CC45CH1H470J | CC | 47pF | ±5% | |
| A-2 | C4 | CM93BD2A100D | CM | 10pF | ±0.5pF | 100WV |
| B-2 | C5 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-2 | C6 | CM93BD2A221J | CM | 220pF | ±5% | 100WV |
| | C7 | No use | | | | |
| B-3 | C8 | C91-0502-05 | MF | 0.01μF | | 630WV |
| C-2 | C9 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-3 | C10 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-2 | C11 | CE04W1C330M | CE | 33μF | | 16WV |
| C-2 | C12 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-3 | C13 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-2 | C14 | CE04W1E101M | CE | 100μF | | 25WV |
| C-2 | C15 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-2 | C16 | CE04W1E101M | CE | 100μF | | 25WV |
| C-3 | C17 | CC45CH1H100D | CC | 10pF | ±0.5pF | |
| | C18 | CC45CH1H470J | CC | 47pF | ±5% | |
| | C19 | CC45CH1H470J | CC | 47pF | ±5% | |
| | C20 | No use | | | | |
| A-1 | C21 | CM93BD2A100D | CM | 10pF | ±0.5pF | 100WV |
| C-1 | C22 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-1 | C23 | CM93BD2A221J | CM | 220pF | ±5% | 100WV |
| B-1 | C24 | CC45CH1H390J | CC | 39pF | ±5% | |
| B-1 | C25 | C91-0502-05 | MF | 0.01μF | | 630WV |
| C-1 | C26 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-2 | C27 | CC45CH1H330J | CC | 33pF | ±5% | |
| C-1 | C28 | CE04W1C330M | CE | 33μF | | 16WV |
| C-1 | C29 | CC45CH1H150J | CC | 15pF | ±5% | |
| C-2 | C30 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-2 | C31 | CE04W1E101M | CE | 100μF | | 25WV |
| C-2 | C32 | CE04W1E101M | CE | 100μF | | 25WV |
| C-1 | C33 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-1 | C34 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-2 | C35 | CC45CH1H100D | CC | 10pF | ±0.5pF | |
| D-3 | C36 | CC45CH1H101J | CC | 100pF | ±5% | |
| D-3 | C37 | CC45CH1H101J | CC | 100pF | ±5% | |
| D-3 | C38 | CC45CH1H101J | CC | 100pF | ±5% | |
| D-3 | C39 | CC45CH1H101J | CC | 100pF | ±5% | |
| D-3 | C40 | CC45CH1H101J | CC | 100pF | ±5% | |
| D-3 | C41 | CC45CH1H101J | CC | 100pF | ±5% | |
| D-3 | C42 | CC45CH1H101J | CC | 100pF | ±5% | |
| D-2 | C43 | CC45CH1H101J | CC | 100pF | ±5% | |
| D-2 | C44 | CC45CH1H101J | CC | 100pF | ±5% | |
| E-2 | C45 | CK45B1H222K | CK | 2200pF | ±10% | |
| E-2 | C46 | CK45B1H222K | CK | 2200pF | ±10% | |
| E-2 | C47 | CK45B1H472K | CK | 4700pF | ±10% | |

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| D-1 | C48 | CC45CH1H101J | CC | 100pF | ±5% | |
| C-3 | C49 | CC45CH1H150J | CC | 15pF | ±5% | |
| | C50 | No use | | | | |
| B-2 | C51 | CK45B1H103K | CK | 0.01μF | ±10% | |
| D-2 | C52 | CK45B1H102K | CK | 1000pF | ±10% | |
| | C53 | CC45CH1H470J | CC | 47pF | ±5% | |
| A-1 | C54 | CC45CH1H080D | CC | 8pF | ±0.5pF | |
| D-1 | C55 | CK45B1H102K | CK | 1000pF | ±10% | |
| B-2 | C56 | CC45CH1H010C | CC | 1pF | ±0.25pF | |
| B-1 | C57 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-3 | C58 | CC45CH1H330J | CC | 33pF | ±5% | |
| | C59 | No use | | | | |
| | C60 | No use | | | | |
| A-3 | C61 | CC45CH1H080D | CC | 8pF | ±0.5pF | |
| B-2 | C62 | CC45CH1H390J | CC | 39pF | ±5% | |
| C-3 | C63 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-1 | C64 | CC45CH1H010C | CC | 1pF | ±0.25pF | |
| C-2 | C65 | CE04W1C330M | CE | 33μF | | 16WV |
| | C66 | No use | | | | |
| B-1 | C67 | CK45B1H103K | CK | 0.01μF | ±10% | |
| A-3 | C68 | CC45CH1H101J | CC | 100pF | ±5% | |
| A-3 | C69 | CK45B1H103K | CK | 0.01μF | ±10% | |
| A-2 | C70 | CC45CH1H101J | CC | 100pF | ±5% | |
| A-2 | C71 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-2 | C72 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-1 | C73 | CE04W1C330M | CE | 33μF | | 16WV |
| A-3 | C74 | CC45CH1H020C | CC | 2pF | ±0.25pF | |
| A-1 | C75 | CC45CH1H020C | CC | 2pF | ±0.25pF | |
| B-3 | C76 | CC45CH1H030C | CC | 3pF | ±0.25pF | |
| B-2 | C77 | CC45CH1H030C | CC | 3pF | ±0.25pF | |
| | C78 | No use | | | | |
| | C79 | No use | | | | |
| | C80 | No use | | | | |
| | C81 | No use | | | | |
| | C82 | CC45CH1H030C | CC | 3pF | ±0.25pF | |
| | C83 | CC45CH1H030C | CC | 3pF | ±0.25pF | |
| B-2 | TC1 | C05-0030-15 | TC | 20pF | | |
| B-3 | TC2 | C05-0030-15 | TC | 20pF | | |
| A-2 | TC3 | C05-0030-15 | TC | 20pF | | |
| B-3 | TC4 | C05-0030-15 | TC | 20pF | | |
| B-3 | TC5 | C05-0062-05 | TC | 6pF | | |
| A-2 | TC6 | C05-0062-05 | TC | 6pF | | |
| A-3 | TC7 | C05-0309-05 | TC | 40pF | | |
| B-2 | TC8 | C05-0030-15 | TC | 20pF | | |
| | TC9 | No use | | | | |
| B-3 | TC10 | C05-0062-05 | TC | 6pF | | |
| C-3 | TC11 | C05-0030-05 | TC | 20pF | | |
| B-1 | TC12 | C05-0030-15 | TC | 20pF | | |
| B-1 | TC13 | C05-0030-15 | TC | 20pF | | |
| A-1 | TC14 | C05-0030-15 | TC | 20pF | | |
| B-1 | TC15 | C05-0030-15 | TC | 20pF | | |
| B-1 | TC16 | C05-0062-05 | TC | 6pF | | |
| A-1 | TC17 | C05-0062-05 | TC | 6pF | | |
| A-1 | TC18 | C05-0309-05 | TC | 40pF | | |
| B-2 | TC19 | C05-0030-15 | TC | 20pF | | |
| | TC20 | No use | | | | |
| B-1 | TC21 | C05-0062-05 | TC | 6pF | | |
| C-2 | TC22 | C05-0030-05 | TC | 20pF | | |
| B-3 | TC23 | C05-0062-05 | TC | 6pF | | |
| B-1 | TC24 | C05-0062-05 | TC | 6pF | | |
| C-3 | L1 | L40-1001-02 | Ferri-inductor | | 10μH | |
| C-3 | L2 | L40-1001-02 | Ferri-inductor | | 10μH | |
| C-1 | L3 | L40-1001-02 | Ferri-inductor | | 10μH | |
| C-1 | L4 | L40-1001-02 | Ferri-inductor | | 10μH | |

# PARTS LIST

## X75-1120-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| B-2 | D1 | | Diode Silicon 1S1544A |
| B-2 | D2 | | Diode Silicon 1S1544A |
| B-1 | D3 | | Diode Silicon 1S1544A |
| B-1 | D4 | | Diode Silicon 1S1544A |
| D-2 | D5 | | Diode Silicon DS442X |
| D-2 | D6 | | Diode Silicon DS442X |
| D-2 | D7 | | Diode Silicon DS442X |
| D-2 | D8 | | Diode Silicon DS442X |
| D-2 | D9 | | Diode Silicon DS442X |
| D-2 | D10 | | Diode Silicon DS442X |
| D-2 | D11 | | Diode Silicon DS442X |
| C-2 | D12 | | Diode Zener YZ-120 |
| C-2 | D13 | | Diode Zener YZ-120 |
| C-1 | D14 | | Diode Zener YZ-120 |
| D-1 | D15 | | Diode Zener YZ-120 |
| C-2 | Q1 | | FET Dual DN1901 |
| C-1 | Q2 | | FET Dual DN1901 |
| D-2 | IC1 | | IC Digital MC14584BCP |
| D-2 | IC2 | | IC Digital MC14584BCP |
| D-2 | IC3 | | IC Digital MC10014BCP |
| D-2 | IC4 | | IC Linear MC14027BCP |
| E-3 | IC5 | | IC Linear SN7404N |
| E-2 | IC6 | | IC Digital MC14174BCP |
| D-1 | IC7 | | IC Digital MC14081BCP |
| E-2 | IC8 | | IC Linear MC14503BCP |
| E-2 | IC9 | | IC Digital SN7432N |
| D-1 | IC10 | | IC Digital MC14027BCP |
| E-1 | IC11 | | IC Digital MC14503BCP |
| C-3 | IC12 | | IC Linear ATM-4010 |
| C-1 | IC13 | | IC Linear ATM-4010 |
| D-2 | P1 | E40-1817-05 | Pin connector 18P |
| D-1 | P2 | E40-0717-05 | Pin connector 7P |
| C-3 | P3 | E40-0611-05 | Pin connector 6P |
| C-1 | P4 | E40-0611-05 | Pin connector 6P |
| E-3 | P5 | E40-1277-05 | Pin connector 12P |
| E-1 | P6 | E40-0577-05 | Pin connector 5P |
| | | E23-0521-04 | Earth terminal |
| | | E29-0504-05 | Teflon terminal |
| A-3 | S1a | S01-4503-05 | Rotary switch |
| B-3 | S1b | S01-4503-05 | Rotary switch |
| B-3 | S1c | S01-4503-05 | Rotary switch |
| B-3 | S1d | S01-4503-05 | Rotary switch |
| B-3 | S1e | S01-4503-05 | Rotary switch |
| | S1f | S01-4503-05 | Rotary switch |
| | S1g | S01-4503-05 | Rotary switch |
| | S1h | S01-4503-05 | Rotary switch |
| A-1 | S2a | S01-4503-05 | Rotary switch |
| B-1 | S2b | S01-4503-05 | Rotary switch |
| B-1 | S2c | S01-4503-05 | Rotary switch |
| B-1 | S2d | S01-4503-05 | Rotary switch |
| B-1 | S2e | S01-4503-05 | Rotary switch |
| | S2f | S01-4503-05 | Rotary switch |
| | S2g | S01-4503-05 | Rotary switch |
| | S2h | S01-4503-05 | Rotary switch |
| | | J25-2977-03 | Printed circuit board |

## VERTICAL PREAMPLIFIER UNIT X73-1320-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| B-3 | R1 | RD14BB2C220J | RD | 22Ω | | |
| B-3 | R2 | RD14BB2C220J | RD | 22Ω | | |
| B-3 | R3 | RN14BK2B1000F | RN | 100Ω | ±1% | 1/8W |
| B-3 | R4 | RD14BB2C242J | RD | 2.4kΩ | | |
| B-3 | R5 | RD14BB2C181J | RD | 180Ω | | |
| B-3 | R6 | RN14BK2B2700F | RN | 270Ω | ±1% | 1/8W |
| B-3 | R7 | RD14BB2C101J | RD | 100Ω | | |
| B-3 | R8 | RN14BK2B2700F | RN | 270Ω | ±1% | 1/8W |
| B-2 | R9 | RD14BB2C112J | RD | 1.1kΩ | | |
| B-2 | R10 | RD14BB2C392J | RD | 3.9kΩ | | |
| B-2 | R11 | RD14BB2C220J | RD | 22Ω | | |
| B-3 | R12 | RD14BB2C220J | RD | 22Ω | | |
| B-3 | R13 | RN14BK2B3001F | RN | 3kΩ | ±1% | 1/8W |
| B-3 | R14 | RN14BK2B1801F | RN | 1.8kΩ | ±1% | 1/8W |
| B-3 | R15 | RN14BK2B3000F | RN | 300Ω | ±1% | 1/8W |
| B-3 | R16 | RN14BK2B7500F | RN | 750Ω | ±1% | 1/8W |
| B-2 | R17 | RN14BK2B7500F | RN | 750Ω | ±1% | 1/8W |
| B-3 | R18 | RN14BK2B5601F | RN | 5.6kΩ | ±1% | 1/8W |
| B-3 | R19 | RN14BK2B5601F | RN | 5.6kΩ | ±1% | 1/8W |
| B-3 | R20 | RN14BK2B3601F | RN | 3.6kΩ | ±1% | 1/8W |
| B-3 | R21 | RN14BK2B3601F | RN | 3.6kΩ | ±1% | 1/8W |
| B-3 | R22 | RN14BK2B1501F | RN | 1.5kΩ | ±1% | 1/8W |
| B-3 | R23 | RN14BK2B1501F | RN | 1.5kΩ | ±1% | 1/8W |
| B-3 | R24 | RD14BB2C220J | RD | 22Ω | | |
| B-2 | R25 | RD14BB2C220J | RD | 22Ω | | |
| B-3 | R26 | RD14BB2C470J | RD | 47Ω | | |
| B-3 | R27 | RN14BK2B4700F | RN | 470Ω | ±1% | 1/8W |
| B-3 | R28 | RN14BK2B4700F | RN | 470Ω | ±1% | 1/8W |
| B-3 | R29 | RN14BK2B51ROF | RN | 51Ω | ±1% | 1/8W |
| C-2 | R30 | RD14BB2C103J | RD | 10kΩ | | |
| C-2 | R31 | RD14BB2C472J | RD | 4.7kΩ | | |
| C-2 | R32 | RD14BB2C472J | RD | 4.7kΩ | | |
| C-2 | R33 | RD14BB2C103J | RD | 10kΩ | | |
| C-2 | R34 | RD14BB2C821J | RD | 820Ω | | |
| C-3 | R35 | RN14BK2B47ROF | RN | 47Ω | ±1% | 1/8W |
| C-3 | R36 | RN14BK2B4300F | RN | 430Ω | ±1% | 1/8W |
| C-3 | R37 | RN14BK2B4300F | RN | 430Ω | ±1% | 1/8W |
| C-3 | R38 | RD14BB2C271J | RD | 270Ω | | |
| | R39 | No use | | | | |
| C-3 | R40 | RN14BK2B1800F | RN | 180Ω | ±1% | 1/8W |
| C-3 | R41 | RN14BK2B4300F | RN | 430Ω | ±1% | 1/8W |
| C-3 | R42 | RN14BK2B4300F | RN | 430Ω | ±1% | 1/8W |
| | R43 | No use | | | | |
| C-3 | R44 | RD14BB2C220J | RD | 22Ω | | |
| C-3 | R45 | RD14BB2C220J | RD | 22Ω | | |
| C-3 | R46 | RN14BK2B1500F | RN | 150Ω | ±1% | 1/8W |
| C-3 | R47 | RD14BB2C123J | RD | 12kΩ | | |
| C-2 | R48 | RD14BB2C330J | RD | 33Ω | | |
| D-2 | R49 | RD14BB2C472J | RD | 4.7kΩ | | |
| C-3 | R50 | RN14BK2B9100F | RN | 910Ω | ±1% | 1/8W |
| C-2 | R51 | RN14BK2B9100F | RN | 910Ω | ±1% | 1/8W |
| C-3 | R52 | RD14BB2C470J | RD | 47Ω | | |
| C-2 | R53 | RD14BB2C470J | RD | 47Ω | | |
| C-3 | R54 | RN14BK2B2400F | RN | 240Ω | ±1% | 1/8W |
| C-2 | R55 | RD14BB2C103J | RD | 10kΩ | | |
| C-3 | R56 | RN14BK2B8200F | RN | 820Ω | ±1% | 1/8W |
| C-2 | R57 | RN14BK2B8200F | RN | 820Ω | ±1% | 1/8W |
| C-3 | R58 | RD14BB2C682J | RD | 6.8kΩ | | |
| C-3 | R59 | RN14BK2B3600F | RN | 360Ω | ±1% | 1/8W |
| C-3 | R60 | RN14BK2B2201F | RN | 2.2kΩ | ±1% | 1/8W |
| C-3 | R61 | RN14BK2B2201F | RN | 2.2kΩ | ±1% | 1/8W |
| C-3 | R62 | RN14BK2B1801F | RN | 1.8kΩ | ±1% | 1/8W |
| C-3 | R63 | RD14BB2C220J | RD | 22Ω | | |
| C-3 | R64 | RD14BB2C220J | RD | 22Ω | | |
| D-3 | R65 | RD14BB2C820J | RD | 820Ω | | |

# PARTS LIST

73-1320-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| -3 | R66 | RD14BB2C430J | RD | 43Ω | | |
| -2 | R67 | RN14BK2B2201F | RN | 2.2kΩ | ±1% | 1/8W |
| -2 | R68 | RN14BK2B2201F | RN | 2.2kΩ | ±1% | 1/8W |
| -2 | R69 | RN14BK2B3600F | RN | 360Ω | ±1% | 1/8W |
| -2 | R70 | RN14BK2B1601F | RN | 1.6kΩ | ±1% | 1/8W |
| -2 | R71 | RD14BB2C220J | RD | 22Ω | | |
| -2 | R72 | RD14BB2C821J | RD | 820Ω | | |
| -2 | R73 | RD14BB2C430J | RD | 43Ω | | |
| -3 | R74 | RD14BB2C220J | RD | 22Ω | | |
| -2 | R75 | RD14BB2C220J | RD | 22Ω | | |
| -2 | R76 | RD14BB2C132J | RD | 1.3kΩ | | |
| -2 | R77 | RD14BB2C392J | RD | 3.9kΩ | | |
| -3 | R78 | RD14BB2C220J | RD | 22Ω | | |
| -2 | R79 | RD14BB2C220J | RD | 22Ω | | |
| -2 | R80 | RD14BB2C101J | RD | 100Ω | | |
| -3 | R81 | RD14BB2C101J | RD | 100Ω | | |
| -2 | R82 | RD14BB2C101J | RD | 100Ω | | |
| -3 | R83 | RD14BB2C102J | RD | 1kΩ | | |
| -2 | R84 | RD14BB2C432J | RD | 4.3kΩ | | |
| -3 | R85 | RD14BB2C472J | RD | 4.7kΩ | | |
| -1 | R86 | RD14BB2C472J | RD | 4.7kΩ | | |
| | R87 | No use | | | | |
| -3 | R88 | RD14BB2C102J | RD | 1kΩ | | |
| -3 | R89 | RD14BB2C432J | RD | 4.3kΩ | | |
| -3 | R90 | RD14BB2C101J | RD | 100Ω | | |
| -3 | R91 | RD14BB2C101J | RD | 100Ω | | |
| -3 | R92 | RD14BB2C101J | RD | 100Ω | | |
| -3 | R93 | RD14BB2C220J | RD | 22Ω | | |
| -3 | R94 | RD14BB2C220J | RD | 22Ω | | |
| -3 | R95 | RD14BB2C132J | RD | 1.3kΩ | | |
| -3 | R96 | RD14BB2C392J | RD | 3.9kΩ | | |
| -3 | R97 | RD14BB2C220J | RD | 22Ω | | |
| -1 | R98 | RD14BB2C220J | RD | 22Ω | | |
| -3 | R99 | RN14BK2B3600F | RN | 360Ω | ±1% | 1/8W |
| -3 | R100 | RN14BK2B2001F | RN | 2kΩ | ±1% | 1/8W |
| -3 | R101 | RN14BK2B2201F | RN | 2.2kΩ | ±1% | 1/8W |
| -3 | R102 | RN14BK2B1801F | RN | 1.8kΩ | ±1% | 1/8W |
| -3 | R103 | RD14BB2C220J | RD | 22Ω | | |
| -3 | R104 | RD14BB2C220J | RD | 22Ω | | |
| -3 | R105 | RD14BB2C821J | RD | 820Ω | | |
| -3 | R106 | RD14BB2C430J | RD | 43Ω | | |
| -3 | R107 | RN14BK2B8200F | RN | 820Ω | ±1% | 1/8W |
| -3 | R108 | RN14BK2B8200F | RN | 820Ω | ±1% | 1/8W |
| -3 | R109 | RD14BB2C391J | RD | 390Ω | | |
| -3 | R110 | RN14BK2B1001F | RN | 1kΩ | ±1% | 1/8W |
| -3 | R111 | RD14BB2C470J | RD | 47Ω | | |
| -3 | R112 | RD14BB2C470J | RD | 47Ω | | |
| -3 | R113 | RN14BK2B7500F | RN | 750Ω | ±1% | 1/8W |
| -3 | R114 | RN14BK2B7500F | RN | 750Ω | ±1% | 1/8W |
| -3 | R115 | RD14BB2C221J | RD | 220Ω | | |
| -3 | R116 | RD14BB2C273J | RD | 27kΩ | | |
| -3 | R117 | RD14BB2C103J | RD | 10kΩ | | |
| -3 | R118 | RN14BK2B2200F | RN | 220Ω | ±1% | 1/8W |
| -3 | R119 | RD14BB2C151J | RD | 150Ω | | |
| -3 | R120 | RD14BB2C151J | RD | 150Ω | | |
| -3 | R121 | RD14BB2C510J | RD | 51Ω | | |
| -3 | R122 | RD14BB2C510J | RD | 51Ω | | |
| -2 | R123 | RD14BB2C103J | RD | 10kΩ | | |
| -2 | R124 | RD14BB2C223J | RD | 22kΩ | | |
| -2 | R125 | RD14BB2C223J | RD | 22kΩ | | |
| -2 | R126 | RD14BB2C472J | RD | 4.7kΩ | | |
| -2 | R127 | RD14BB2C472J | RD | 4.7kΩ | | |
| -2 | R128 | RD14BB2C473J | RD | 47kΩ | | |
| -2 | R129 | RD14BB2C473J | RD | 47kΩ | | |
| -2 | R130 | RD14BB2C331J | RD | 330Ω | | |
| -2 | R131 | RD14BB2C472J | RD | 4.7kΩ | | |

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| -2 | R132 | RD14BB2C103J | RD | 10kΩ | | |
| -2 | R133 | RN14BK2B4300F | RN | 430Ω | ±1% | 1/8W |
| -2 | R134 | RN14BK2B4300F | RN | 430Ω | ±1% | 1/8W |
| -2 | R135 | RN14BK2B4300F | RN | 430Ω | ±1% | 1/8W |
| -2 | R136 | RN14BK2B4300F | RN | 430Ω | ±1% | 1/8W |
| -2 | R137 | RN14BK2B8200F | RN | 820Ω | ±1% | 1/8W |
| -2 | R138 | RN14BK2B8200F | RN | 820Ω | ±1% | 1/8W |
| | R139 | No use | | | | |
| -2 | R140 | RN14BK2B4700F | RN | 470Ω | ±1% | 1/8W |
| -2 | R141 | RN14BK2B3600F | RN | 360Ω | ±1% | 1/8W |
| -2 | R142 | RN14BK2B2201F | RN | 2.2kΩ | ±1% | 1/8W |
| -2 | R143 | RN14BK2B2201F | RN | 2.2kΩ | ±1% | 1/8W |
| -2 | R144 | RN14BK2B1801F | RN | 1.8kΩ | ±1% | 1/8W |
| -2 | R145 | RD14BB2C220J | RD | 22Ω | | |
| -2 | R146 | RD14BB2C220J | RD | 22Ω | | |
| -2 | R147 | RD14BB2C821J | RD | 820Ω | | |
| -2 | R148 | RD14BB2C430J | RD | 43Ω | | |
| -2 | R149 | RD14BB2C220J | RD | 22Ω | | |
| -2 | R150 | RD14BB2C220J | RD | 22Ω | | |
| -2 | R151 | RN14BK2B1101F | RN | 1.1kΩ | ±1% | 1/8W |
| -2 | R152 | RN14BK2B9100F | RN | 910Ω | ±1% | 1/8W |
| -2 | R153 | RN14BK2B9100F | RN | 910Ω | ±1% | 1/8W |
| -2 | R154 | RN14BK2B1101F | RN | 1.1kΩ | ±1% | 1/8W |
| -2 | R155 | RN14BK2B3300F | RN | 330Ω | ±1% | 1/8W |
| -2 | R156 | RN14BK2B3300F | RN | 330Ω | ±1% | 1/8W |
| -2 | R157 | RN14BK2B1001F | RN | 1kΩ | ±1% | 1/8W |
| -2 | R158 | RN14BK2B2200F | RN | 220Ω | ±1% | 1/8W |
| -2 | R159 | RN14BK2B1001F | RN | 1kΩ | ±1% | 1/8W |
| -2 | R160 | RN14BK2B7500F | RN | 750Ω | ±1% | 1/8W |
| -2 | R161 | RN14BK2B7500F | RN | 750Ω | ±1% | 1/8W |
| -2 | R162 | RD14BB2C470J | RD | 47Ω | | |
| -2 | R163 | RD14BB2C470J | RD | 47Ω | | |
| -1 | R164 | RD14BB2C220J | RD | 22Ω | | |
| -1 | R165 | RD14BB2C220J | RD | 22Ω | | |
| 21 | R166 | RN14BK2B1000F | RN | 100Ω | ±1% | 1/8W |
| -2 | R167 | RD14BB2C241J | RD | 240Ω | | |
| -2 | R168 | RD14BB2C682J | RD | 6.8kΩ | | |
| -2 | R169 | RN14BK2B2700F | RN | 270Ω | ±1% | 1/8W |
| -2 | R170 | RN14BK2B2700F | RN | 270Ω | ±1% | 1/8W |
| -2 | R171 | RN14BK2B1801F | RN | 1.8kΩ | ±1% | 1/8W |
| -2 | R172 | RN14BK2B5601F | RN | 5.6kΩ | ±1% | 1/8W |
| -2 | R173 | RN14BK2B1801F | RN | 1.8kΩ | ±1% | 1/8W |
| -2 | R174 | RN14BK2B5101F | RN | 5.1kΩ | ±1% | 1/8W |
| -2 | R175 | RN14BK2B3000F | RN | 300Ω | ±1% | 1/8W |
| -2 | R176 | RD14BB2C331J | RD | 330Ω | | |
| -2 | R177 | RN14BK2B2201F | RN | 2.2kΩ | ±1% | 1/8W |
| -2 | R178 | RN14BK2B6801F | RN | 6.8kΩ | ±1% | 1/8W |
| -2 | R179 | RN14BK2B2201F | RN | 2.2kΩ | ±1% | 1/8W |
| -2 | R180 | RD14BB2C273J | RD | 27kΩ | | |
| -1 | R181 | RD14BB2C220J | RD | 22Ω | | |
| -1 | R182 | RD14BB2C220J | RD | 22Ω | | |
| -1 | R183 | RD14BB2C112J | RD | 1.1kΩ | | |
| -1 | R184 | RD14BB2C392J | RD | 3.9kΩ | | |
| -1 | R185 | RD14BB2C220J | RD | 22Ω | | |
| -1 | R186 | RD14BB2C220J | RD | 22Ω | | |
| -1 | R187 | RD14BB2C112J | RD | 1.1kΩ | | |
| -1 | R188 | RD14BB2C392J | RD | 3.9kΩ | | |
| -1 | R189 | RN14BK2B7500F | RN | 750Ω | ±1% | 1/8W |
| -1 | R190 | RN14BK2B7500F | RN | 750Ω | ±1% | 1/8W |
| -1 | R191 | RN14BK2B5601F | RN | 5.6kΩ | ±1% | 1/8W |
| -1 | R192 | RN14BK2B5601F | RN | 5.6kΩ | ±1% | 1/8W |
| -1 | R193 | RN14BK2B3601F | RN | 3.6kΩ | ±1% | 1/8W |
| -1 | R194 | RN14BK2B3601F | RN | 3.6kΩ | ±1% | 1/8W |
| -1 | R195 | RN14BK2B1501F | RN | 1.5kΩ | ±1% | 1/8W |
| -1 | R196 | RN14BK2B1501F | RN | 1.5kΩ | ±1% | 1/8W |
| -2 | R197 | RD14BB2C220J | RD | 22Ω | | |

# PARTS LIST

X73-1320-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| B-1 | R198 | RD14BB2C220J | RD | 22Ω | | |
| B-1 | R199 | RD14BB2C470J | RD | 47Ω | | |
| B-1 | R200 | RN14BK2B4700F | RN | 470Ω | ±1% | 1/8W |
| B-1 | R201 | RN14BK2B4700F | RN | 470Ω | ±1% | 1/8W |
| B-2 | R202 | RN14BK2B51ROF | RN | 51Ω | ±1% | 1/8W |
| C-2 | R203 | RD14BB2C103J | RD | 10kΩ | | |
| C-2 | R204 | RD14BB2C472J | RD | 4.7kΩ | | |
| C-2 | R205 | RD14BB2C472J | RD | 4.7kΩ | | |
| C-2 | R206 | RD14BB2C103J | RD | 10kΩ | | |
| C-2 | R207 | RD14BB2C821J | RD | 820Ω | | |
| C-2 | R208 | RN14BK2B47ROF | RN | 47Ω | ±1% | 1/8W |
| C-1 | R209 | RN14BK2B4300F | RN | 430Ω | ±1% | 1/8W |
| C-1 | R210 | RN14BK2B4300F | RN | 430Ω | ±1% | 1/8W |
| C-1 | R211 | RD14BB2C301J | RD | 300Ω | | |
| | R212 | No use | | | | |
| C-1 | R213 | RN14BK2B1800F | RN | 180Ω | ±1% | 1/8W |
| C-2 | R214 | RN14BK2B4300F | RN | 430Ω | ±1% | 1/8W |
| C-1 | R215 | RN14BK2B4300F | RN | 430Ω | ±1% | 1/8W |
| | R216 | No use | | | | |
| C-2 | R217 | RD14BB2C220J | RD | 22Ω | | |
| C-1 | R218 | RD14BB2C220J | RD | 22Ω | | |
| C-1 | R219 | RN14BK2B1500F | RN | 150Ω | ±1% | 1/8W |
| C-1 | R220 | RD14BB2C123J | RD | 12kΩ | | |
| | R221 | RD14BB2C330J | RD | 33Ω | | |
| C-1 | R222 | RD14BB2C682J | RD | 6.8kΩ | | |
| C-1 | R223 | RN14BK2B9100F | RN | 910Ω | ±1% | 1/8W |
| C-1 | R224 | RN14BK2B9100F | RN | 910Ω | ±1% | 1/8W |
| C-1 | R225 | RD14BB2C470J | RD | 47Ω | | |
| C-1 | R226 | RD14BB2C470J | RD | 47Ω | | |
| C-1 | R227 | RN14BK2B2000F | RN | 200Ω | ±1% | 1/8W |
| | R228 | No use | | | | |
| C-1 | R229 | RN14BK2B8200F | RN | 820Ω | ±1% | 1/8W |
| C-1 | R230 | RN14BK2B8200F | RN | 820Ω | ±1% | 1/8W |
| C-2 | R231 | RN14BK2B3600F | RN | 360Ω | ±1% | 1/8W |
| C-2 | R232 | RN14BK2B2201F | RN | 2.2kΩ | ±1% | 1/8W |
| C-2 | R233 | RN14BK2B2201F | RN | 2.2kΩ | ±1% | 1/8W |
| C-2 | R234 | RN14BK2B1801F | RN | 1.8kΩ | ±1% | 1/8W |
| C-2 | R235 | RD14BB2C220J | RD | 22Ω | | |
| C-2 | R236 | RD14BB2C220J | RD | 22Ω | | |
| D-2 | R237 | RD14BB2C821J | RD | 820Ω | | |
| D-2 | R238 | RD14BB2C430J | RD | 43Ω | | |
| D-1 | R239 | RD14BB2C220J | RD | 22Ω | | |
| D-1 | R240 | RD14BB2C220J | RD | 22Ω | | |
| D-1 | R241 | RD14BB2C132J | RD | 1.3kΩ | | |
| D-1 | R242 | RD14BB2C392J | RD | 3.9kΩ | | |
| D-1 | R243 | RD14BB2C220J | RD | 22Ω | | |
| D-1 | R244 | RD14BB2C220J | RD | 22Ω | | |
| D-1 | R245 | RD14BB2C101J | RD | 100Ω | | |
| D-1 | R246 | RD14BB2C101J | RD | 100Ω | | |
| D-1 | R247 | RD14BB2C101J | RD | 100Ω | | |
| D-1 | R248 | RD14BB2C102J | RD | 1kΩ | | |
| D-1 | R249 | RD14BB2C432J | RD | 4.3kΩ | | |
| D-1 | R250 | RD14BB2C102J | RD | 1kΩ | | |
| D-1 | R251 | RD14BB2C432J | RD | 4.3kΩ | | |
| D-1 | R252 | RD14BB2C101J | RD | 100Ω | | |
| D-1 | R253 | RD14BB2C101J | RD | 100Ω | | |
| D-1 | R254 | RD14BB2C101J | RD | 100Ω | | |
| D-1 | R255 | RD14BB2C220J | RD | 22Ω | | |
| D-1 | R256 | RD14BB2C220J | RD | 22Ω | | |
| D-1 | R257 | RD14BB2C132J | RD | 1.3kΩ | | |
| D-1 | R258 | RD14BB2C392J | RD | 3.9kΩ | | |
| D-1 | R259 | RD14BB2C220J | RD | 22Ω | | |
| D-1 | R260 | RD14BB2C220J | RD | 22Ω | | |
| E-1 | R261 | RN14BK2B3600F | RN | 360Ω | ±1% | 1/8W |
| E-1 | R262 | RN14BK2B2001F | RN | 2kΩ | ±1% | 1/8W |
| E-1 | R263 | RN14BK2B2201F | RN | 2.2kΩ | ±1% | 1/8W |

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| E-1 | R264 | RN14BK2B1801F | RN | 1.8kΩ | ±1% | 1/8W |
| E-1 | R265 | RD14BB2C220J | RD | 22Ω | | |
| E-1 | R266 | RD14BB2C220J | RD | 22Ω | | |
| E-1 | R267 | RD14BB2C821J | RD | 820Ω | | |
| E-1 | R268 | RD14BB2C430J | RD | 43Ω | | |
| E-1 | R269 | RN14BK2B8200F | RN | 820Ω | ±1% | 1/8W |
| E-1 | R270 | RN14BK2B8200F | RN | 820Ω | ±1% | 1/8W |
| E-1 | R271 | RD14BB2C391J | RD | 390Ω | | |
| E-1 | R272 | RN14BK2B1001F | RN | 1kΩ | ±1% | 1/8W |
| D-1 | R273 | RD14BB2C470J | RD | 47Ω | | |
| D-1 | R274 | RD14BB2C470J | RD | 47Ω | | |
| E-1 | R275 | RN14BK2B7500F | RN | 750Ω | ±1% | 1/8W |
| D-1 | R276 | RN14BK2B7500F | RN | 750Ω | ±1% | 1/8W |
| D-1 | R277 | RD14BB2C221J | RD | 220Ω | | |
| D-1 | R278 | RD14BB2C273J | RD | 27kΩ | | |
| D-1 | R279 | RD14BB2C103J | RD | 10kΩ | | |
| E-1 | R280 | RN14BK2B2200F | RN | 220Ω | ±1% | 1/8W |
| D-1 | R281 | RD14BB2C151J | RD | 150Ω | | |
| D-1 | R282 | RD14BB2C151J | RD | 150Ω | | |
| E-1 | R283 | RD14BB2C510J | RD | 51Ω | | |
| E-1 | R284 | RD14BB2C510J | RD | 51Ω | | |
| E-2 | R285 | RD14BB2C472J | RD | 4.7kΩ | | |
| F-2 | R286 | RD14BB2C103J | RD | 10kΩ | | |
| F-2 | R287 | RD14BB2C103J | RD | 10kΩ | | |
| E-2 | R288 | RD14BB2C103J | RD | 10kΩ | | |
| E-2 | R289 | RD14BB2C103J | RD | 10kΩ | | |
| | R290 | No use | | | | |
| | R291 | No use | | | | |
| C-2 | R292 | RD14BB2C220J | RD | 22Ω | | |
| | R293 | No use | | | | |
| | R294 | No use | | | | |
| B-1 | R295 | RD14BB2C330J | RD | 33Ω | | |
| | R296 | No use | | | | |
| | R297 | No use | | | | |
| | R298 | No use | | | | |
| E-2 | R299 | RD14BB2C222J | RD | 2.2kΩ | | |
| E-2 | R300 | RD14BB2C222J | RD | 2.2kΩ | | |
| E-2 | R301 | RD14BB2C222J | RD | 2.2kΩ | | |
| | R302 | No use | | | | |
| | R303 | No use | | | | |
| E-2 | R304 | RD14BB2C220J | RD | 22Ω | | |
| E-2 | R305 | RD14BB2C220J | RD | 22Ω | | |
| | R306 | RD14BB2C101J | RD | 100Ω | | |
| B-3 | R307 | RN14BK2B1501F | RN | 1.5kΩ | ±1% | 1/8W |
| B-1 | R308 | RN14BK2B1501F | RN | 1.5kΩ | ±1% | 1/8W |
| C-2 | R309 | RD14BB2C470J | RD | 47Ω | | |
| | R310 | RD14BB2C470J | RD | 47Ω | | |
| D-2 | R311 | RD14BB2C100J | RD | 10Ω | | |
| E-3 | R312 | RD14BB2C470J | RD | 47Ω | | |
| C-2 | R313 | RD14BB2C470J | RD | 47Ω | | |
| E-1 | R314 | RD14BB2C470J | RD | 47Ω | | |
| E-2 | R315 | RD14BB2C470J | RD | 47Ω | | |
| E-2 | R316 | RD14BB2C470J | RD | 47Ω | | |
| B-2 | R317 | RD14BB2C473J | RD | 47kΩ | | |
| B-1 | R318 | RD14BB2C473J | RD | 47kΩ | | |
| A-2 | R319 | RD14BB2C103J | RD | 10kΩ | | |
| A-2 | R320 | RD14BB2C822J | RD | 8.2kΩ | | |
| A-2 | R321 | RD14BB2C103J | RD | 10kΩ | | |
| A-2 | R322 | RD14BB2C103J | RD | 10kΩ | | |
| A-2 | R323 | RD14BB2C752J | RD | 7.5kΩ | | |
| A-2 | R324 | RD14BB2C332J | RD | 3.3kΩ | | |
| B-3 | R325 | RD14BB2C271J | RD | 270Ω | | |
| B-2 | R326 | RD14BB2C271J | RD | 270Ω | | |
| | R327 | No use | | | | |
| | R328 | No use | | | | |
| | R329 | No use | | | | |

# PARTS LIST

X73-1320-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | |
|---|---|---|---|---|---|
| C-3 | R330 | RD14BB2C331J | RD | 330Ω | |
| C-1 | R331 | RD14BB2C100J | RD | 10Ω | |
| C-3 | R332 | RD14BB2C1ROJ | RD | 1Ω | |
| D-3 | R333 | RD14BB2C470J | RD | 47Ω | |
| D-1 | R334 | RD14BB2C470J | RD | 47Ω | |
| E-3 | VR1 | R01-0512-05 | VR | 500Ω | |
| E-1 | VR2 | R01-0512-05 | VR | 500Ω | |
| B-3 | VR3 | R12-0421-05 | VR | 100Ω | |
| E-3 | VR4 | R12-0421-05 | VR | 100Ω | |
| C-3 | VR5 | R12-0421-05 | VR | 100Ω | |
| C-3 | VR6 | R12-0421-05 | VR | 100Ω | |
| C-3 | VR7 | R12-0540-05 | VR | 500Ω | |
| C-2 | VR8 | R12-0539-05 | VR | 200Ω | |
| C-2 | VR9 | R12-0540-05 | VR | 500Ω | |
| E-3 | VR10 | R12-0540-05 | VR | 500Ω | |
| E-3 | VR11 | R12-0421-05 | VR | 100Ω | |
| | VR12 | No use | | | |
| E-2 | VR13 | R12-0421-05 | VR | 100Ω | |
| B-2 | VR14 | R12-0421-05 | VR | 100Ω | |
| B-2 | VR15 | R12-0421-05 | VR | 100Ω | |
| C-1 | VR16 | R12-0421-05 | VR | 100Ω | |
| C-1 | VR17 | R12-0421-05 | VR | 100Ω | |
| C-1 | VR18 | R12-0539-05 | VR | 200Ω | |
| C-1 | VR19 | R12-0540-05 | VR | 500Ω | |
| E-1 | VR20 | R12-0540-05 | VR | 500Ω | |
| E-1 | VR21 | R12-0421-05 | VR | 100Ω | |
| D-2 | VR22 | R12-0540-05 | VR | 500Ω | |
| B-3 | C1 | CC45CH1H150J | CC | 15pF | ±5% |
| B-3 | C2 | CC45CH1H220J | CC | 22pF | ±5% |
| B-3 | C3 | CK45B1H103K | CK | 0.01μF | ±10% |
| B-3 | C4 | CK45B1H103K | CK | 0.01μF | ±10% |
| B-3 | C5 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| C-3 | C6 | CC45CH1H020C | CC | 2pF | ±0.25pF |
| B-2 | C7 | CK45B1H103K | CK | 0.01μF | ±10% |
| C-2 | C8 | CK45B1H103K | CK | 0.01μF | ±10% |
| C-3 | C9 | CC45CH1H120J | CC | 12pF | ±5% |
| | C10 | No use | | | |
| C-2 | C11 | CK45B1H222K | CK | 2200pF | ±10% |
| | C12 | No use | | | |
| D-3 | C13 | CC45CH1H270J | CC | 27pF | ±5% |
| C-2 | C14 | CC45CH1H220J | CC | 22pF | ±5% |
| C-3 | C15 | CK45B1H103K | CK | 0.01μF | ±10% |
| C-2 | C16 | No use | | | |
| | C17 | No use | | | |
| | C18 | No use | | | |
| E-3 | C19 | CC45CH1H150J | CC | 15pF | ±5% |
| E-3 | C20 | CC45CH1H070D | CC | 7pF | ±0.5pF |
| D-3 | C21 | CK45B1H102K | CK | 1000pF | ±10% |
| D-3 | C22 | CC45CH1H220J | CC | 22pF | ±5% |
| E-3 | C23 | CC45CH1H680J | CC | 68pF | ±5% |
| D-2 | C24 | CK45B1H103K | CK | 0.01μF | ±10% |
| E-2 | C25 | CC45CH1H151J | CC | 150pF | ±5% |
| D-2 | C26 | CC45CH1H151J | CC | 150pF | ±5% |
| D-2 | C27 | CK45B1H103K | CK | 0.01μF | ±10% |
| E-2 | C28 | CC45CH1H220J | CC | 22pF | ±5% |
| | C29 | No use | | | |
| | C30 | No use | | | |
| E-2 | C31 | CC45CH1H020C | CC | 2pF | ±0.25pF |
| E-2 | C32 | CC45CH1H050C | CC | 5pF | ±0.25pF |
| | C33 | No use | | | |
| D-3 | C34 | CC45CH1H150J | CC | 15pF | ±5% |
| D-1 | C35 | CC45CH1H150J | CC | 15pF | ±5% |
| E-2 | C36 | CC45CH1H070D | CC | 7pF | ±0.5pF |
| E-2 | C37 | CC45CH1H070D | CC | 7pF | ±0.5pF |
| B-2 | C38 | CC45CH1H330J | CC | 33pF | ±5% |
| B-2 | C39 | CC45SL1H330J | CC | 33pF | ±5% |

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| B-1 | C40 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-1 | C41 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-2 | C42 | CC45CH1H030C | CC | 3pF | ±0.25pF | |
| C-1 | C43 | CC45CH1H020C | CC | 2pF | ±0.25pF | |
| C-2 | C44 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-2 | C45 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-1 | C46 | CC45CH1H120J | CC | 12pF | ±5% | |
| | C47 | No use | | | | |
| C-1 | C48 | CK45B1H222K | CK | 2200pF | ±10% | |
| | C49 | No use | | | | |
| C-1 | C50 | CC45CH1H390J | CC | 39pF | ±5% | |
| C-1 | C51 | CC45CH1H220J | CC | 22pF | ±5% | |
| | C52 | No use | | | | |
| C-1 | C53 | CC45CH1H220J | CC | 22pF | ±5% | |
| D-1 | C54 | CK45B1H103K | CK | 0.01μF | ±10% | |
| D-1 | C55 | CK45B1H103K | CK | 0.01μF | ±10% | |
| E-1 | C56 | CC45CH1H150J | CC | 15pF | ±5% | |
| E-1 | C57 | CC45CH1H070D | CC | 7pF | ±0.5pF | |
| D-1 | C58 | CK45B1H102K | CK | 1000pF | ±10% | |
| D-1 | C59 | CC45CH1H220J | CC | 22pF | ±5% | |
| E-1 | C60 | CC45CH1H680J | CC | 68pF | ±5% | |
| B-2 | C61 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-3 | C62 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-2 | C63 | CE04W1C101M | CE | 100μF | | 16WV |
| B-3 | C64 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-3 | C65 | CE04W1C101M | CE | 100μF | | 16WV |
| B-2 | C66 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-2 | C67 | CE04W1C101M | CE | 100μF | | 16WV |
| C-3 | C68 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-3 | C69 | CE04W1H010M | CE | 1μF | | 50WV |
| C-3 | C70 | CE04W1C101M | CE | 100μF | | 16WV |
| C-2 | C71 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| C-2 | C72 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-3 | C73 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-2 | C74 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-2 | C75 | CE04W1C101M | CE | 100μF | | 16WV |
| C-2 | C76 | CE04W1C101M | CE | 100μF | | 16WV |
| D-2 | C77 | CE04W1C331M | CE | 330μF | | 16WV |
| D-3 | C78 | CE04W1C101M | CE | 100μF | | 16WV |
| E-3 | C79 | CK45B1H103K | CK | 0.01μF | ±10% | |
| E-2 | C80 | CE04W1C331M | CE | 330μF | | 16WV |
| E-3 | C81 | CE04W1C221M | CE | 220μF | | 16WV |
| F-3 | C82 | CE04W1C471M | CE | 470μF | | 16WV |
| E-2 | C83 | CE04W1C221M | CE | 220μF | | 16WV |
| F-3 | C84 | CE04W1C470M | CE | 47μF | | 16WV |
| B-1 | C85 | CK45B1H103K | CK | 0.01μF | ±10% | |
| D-1 | C86 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-1 | C87 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-1 | C88 | CE04W1C101M | CE | 100μF | | 16WV |
| B-2 | C89 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-2 | C90 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-2 | C91 | CE04W1C101M | CE | 100μF | | 16WV |
| B-1 | C92 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-1 | C93 | CE04W1C101M | CE | 100μF | | 16WV |
| C-2 | C94 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-1 | C95 | CE04W1H010M | CE | 1μF | | 50WV |
| C-2 | C96 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-2 | C97 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-2 | C98 | CE04W1C101M | CE | 100μF | | 16WV |
| C-2 | C99 | CE04W1C101M | CE | 100μF | | 16WV |
| C-1 | C100 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-1 | C101 | CE04W1C101M | CE | 100μF | | 16WV |
| | C102 | No use | | | | |
| C-2 | C103 | CE04W1H010M | CE | 1μF | | 50WV |
| D-1 | C104 | CE04W1C101M | CE | 100μF | | 16WV |
| F-1 | C105 | CE04W1C471M | CE | 470μF | | 16WV |

# PARTS LIST

X73-1320-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| E-1 | C106 | CK45B1H103K | CK | 0.01μF | ±10% | |
| E-2 | C107 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-2 | C108 | CC45SL1H680J | CC | 68pF | ±5% | |
| F-1 | C109 | CE04W1C470M | CE | 47μF | | 16WV |
| F-2 | C110 | CK45B1H103K | CK | 0.01μF | ±10% | |
| F-1 | C111 | CK45B1H103K | CK | 0.01μF | ±10% | |
| E-3 | C112 | CK45B1H103K | CK | 0.01μF | ±10% | |
| | C113 | No use | | | | |
| | C114 | No use | | | | |
| | C115 | No use | | | | |
| | C116 | No use | | | | |
| D-3 | C117 | CC45SL1H101J | CC | 100pF | ±5% | |
| E-3 | C118 | CC45SL1H101J | CC | 100pF | ±5% | |
| D-2 | C119 | CC45SL1H101J | CC | 100pF | ±5% | |
| B-1 | C120 | CC45CH1H150J | CC | 15pF | ±5% | |
| | C121 | No use | | | | |
| D-2 | C122 | CC45SL1H101J | CC | 100pF | ±5% | |
| E-1 | C123 | CC45SL1H101J | CC | 100pF | ±5% | |
| D-3 | C124 | CE04W1H010M | CE | 1μF | | 50WV |
| D-2 | C125 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| D-2 | C126 | CC45SL1H101J | CC | 100pF | ±5% | |
| F-3 | C127 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| D-2 | C128 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| D-2 | C129 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| F-1 | C130 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| B-3 | C131 | CC45CH1H120J | CC | 12pF | ±5% | |
| B-1 | C132 | CC45CH1H120J | CC | 12pF | ±5% | |
| | C133 | No use | | | | |
| | C134 | No use | | | | |
| E-2 | C135 | CC45CH1H150J | CC | 15pF | ±5% | |
| E-2 | C136 | CC45CH1H150J | CC | 15pF | ±5% | |
| | C137 | No use | | | | |
| | C138 | CC45CH1H150J | CC | 15pF | ±5% | |
| | C139 | No use | | | | |
| D-3 | C140 | CC45CH1H030C | CC | 3pF | ±0.25pF | |
| C-1 | C141 | CC45CH1H030C | CC | 3pF | ±0.25pF | |
| D-2 | C142 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-1 | C143 | CK45B1H103K | CK | 0.01μF | ±10% | |
| | C144 | No use | | | | |
| | C145 | No use | | | | |
| D-3 | C146 | CC45CH1H030C | CC | 3pF | ±0.25pF | |
| D-1 | C147 | CC45CH1H030C | CC | 3pF | ±0.25pF | |
| | C148 | No use | | | | |
| | C149 | No use | | | | |
| A-3 | C150 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| C-2 | C151 | CC45SL1H680J | CC | 68pF | ±5% | |
| | C152 | No use | | | | |
| C-3 | C153 | CC45SL1H680J | CC | 68pF | ±5% | |
| | C154 | No use | | | | |
| D-2 | C155 | CC45CH1H100J | CC | 10pF | ±5% | |
| | C156 | No use | | | | |
| E-3 | C157 | CC45SL1H680J | CC | 68pF | ±5% | |
| | C158 | No use | | | | |
| D-2 | C159 | CK45B1H103K | CK | 0.01μF | ±10% | |
| E-2 | C160 | CC45CH1H050C | CC | 5pF | ±0.25pF | |
| E-2 | C161 | CC45CH1H050C | CC | 5pF | ±0.25pF | |
| A-1 | C162 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| C-2 | C163 | CC45SL1H680J | CC | 68pF | ±5% | |
| | C164 | No use | | | | |
| E-1 | C165 | CC45SL1H680J | CC | 68pF | ±5% | |
| | C166 | No use | | | | |
| D-3 | C167 | CC45CH1H150J | CC | 15pF | ±5% | |
| C-2 | C168 | CC45CH1H150J | CC | 15pF | ±5% | |
| D-2 | C169 | CC45CH1H150J | CC | 15pF | ±5% | |
| E-3 | C170 | CC45CH1H150J | CC | 15pF | ±5% | |
| C-2 | C171 | CC45CH1H150J | CC | 15pF | ±5% | |

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | |
|---|---|---|---|---|---|
| E-1 | C172 | CC45CH1H150J | CC | 15pF | ±5% |
| | C173 | No use | | | |
| C-1 | C174 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| | C175 | No use | | | |
| | C176 | No use | | | |
| | C177 | No use | | | |
| | C178 | No use | | | |
| | C179 | No use | | | |
| | C180 | No use | | | |
| | C181 | No use | | | |
| C-2 | C182 | CK45B1H103K | CK | 0.01μF | ±10% |
| C-3 | C183 | CC45CH1H101J | CC | 100pF | ±5% |
| | C184 | No use | | | |
| | C185 | No use | | | |
| | C186 | No use | | | |
| | C187 | No use | | | |
| | C188 | No use | | | |
| | C189 | No use | | | |
| C-2 | C190 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| | C191 | No use | | | |
| | C192 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| | C193 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| | C194 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| | C195 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| | C196 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| | C197 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| | C198 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| | C199 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| | C200 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| | C201 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| | C202 | No use | | | |
| | C203 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| | C204 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| | C205 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| | C206 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| | C207 | CC45CH1H030C | CC | 3pF | ±0.25pF |
| B-3 | TC1 | C05-0030-15 | TC | 20pF | |
| B-3 | TC2 | C05-0030-15 | TC | 20pF | |
| D-3 | TC3 | C05-0030-15 | TC | 20pF | |
| D-3 | TC4 | C05-0030-15 | TC | 20pF | |
| B-1 | TC5 | C05-0030-15 | TC | 20pF | |
| C-3 | TC6 | C05-0030-15 | TC | 20pF | |
| D-1 | TC7 | C05-0030-15 | TC | 20pF | |
| D-1 | TC8 | C05-0030-15 | TC | 20pF | |
| C-2 | TC9 | C05-0309-15 | TC | 40pF | |
| C-3 | TC10 | C05-0030-15 | TC | 20pF | |
| C-1 | TC11 | C05-0030-15 | TC | 20pF | |
| B-3 | L1 | L40-2201-03 | Ferri-inductor | | 22μH |
| B-3 | L2 | L40-2201-03 | Ferri-inductor | | 22μH |
| C-2 | L3 | L40-2201-03 | Ferri-inductor | | 22μH |
| | L4 | No use | | | |
| | L5 | No use | | | |
| D-3 | L6 | L40-2201-03 | Ferri-inductor | | 22μH |
| B-1 | L7 | L40-2201-03 | Ferri-inductor | | 22μH |
| C-2 | L8 | L40-2201-03 | Ferri-inductor | | 22μH |
| C-1 | L9 | L40-2201-03 | Ferri-inductor | | 22μH |
| | L10 | No use | | | |
| D-1 | L11 | L40-2201-03 | Ferri-inductor | | 22μH |
| | L12 | L40-6882-01 | Ferri-inductor | | 0.68μH |
| D-3 | D1 | | Diode | Silicon | DS442X |
| D-1 | D2 | | Diode | Silicon | DS442X |
| D-3 | D3 | | Diode | Silicon | DS442X |
| D-1 | D4 | | Diode | Silicon | DS442X |
| B-2 | D5 | | Diode | Silicon | DS442X |
| B-2 | D6 | | Diode | Silicon | DS442X |

# PARTS LIST

X73-1320-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | |
|---|---|---|---|---|---|
| D-3 | D7 | | Diode | Silicon | DS442X |
| D-3 | D8 | | Diode | Silicon | DS442X |
| | D9 | No use | | | |
| | D10 | No use | | | |
| D-2 | D11 | | Diode | Zener | WZ-071 |
| D-2 | D12 | | Diode | Zener | WZ-071 |
| D-2 | D13 | | Diode | Silicon | DS442X |
| E-2 | D14 | | Diode | Silicon | DS442X |
| F-2 | D15 | | Diode | Silicon | DS442X |
| E-2 | D16 | | Diode | Silicon | DS442X |
| E-2 | D17 | | Diode | Silicon | DS442X |
| E-2 | D18 | | Diode | Silicon | DS442X |
| F-2 | D19 | | Diode | Silicon | DS442X |
| E-2 | D20 | | Diode | Silicon | DS442X |
| E-2 | D21 | | Diode | Silicon | DS442X |
| E-2 | D22 | | Diode | Silicon | DS442X |
| E-2 | D23 | | Diode | Silicon | DS442X |
| E-2 | D24 | | Diode | Silicon | DS442X |
| F-2 | D25 | | Diode | Silicon | DS442X |
| F-2 | D26 | | Diode | Silicon | DS442X |
| E-2 | D27 | | Diode | Silicon | DS442X |
| F-2 | D28 | | Diode | Silicon | DS442X |
| F-2 | D29 | | Diode | Silicon | DS442X |
| C-3 | D30 | | Diode | Silicon | DS442X |
| C-2 | D31 | | Diode | Silicon | DS442X |
| E-3 | D32 | | Diode | Silicon | DS442X |
| D-2 | D33 | | Diode | Silicon | DS442X |
| C-2 | D34 | | Diode | Silicon | DS442X |
| E-1 | D35 | | Diode | Silicon | DS442X |
| C-3 | D36 | | Diode | Zener | WZ-061 |
| C-1 | D37 | | Diode | Zener | WZ-061 |
| | D38 | No use | | | |
| | D39 | No use | | | |
| B-3 | D40 | | Diode | Silicon | 1S2686 |
| B-3 | D41 | | Diode | Silicon | 1S2686 |
| B-1 | D42 | | Diode | Silicon | 1S2686 |
| B-1 | D43 | | Diode | Silicon | 1S2686 |
| A-2 | D44 | | Diode | Silicon | DS442X |
| B-3 | Q1 | | TR | NPN | 2SC536KNP (F) |
| B-3 | Q2 | | TR | NPN | 2SC1215 (T or S) |
| B-2 | Q3 | | TR | NPN | 2SC1215 (T or S) |
| C-3 | Q4 | | TR | PNP | 2SA838 (C) |
| C-3 | Q5 | | TR | PNP | 2SA838 (C) |
| C-3 | Q6 | | TR | PNP | 2SA838 (C) |
| C-3 | Q7 | | TR | PNP | 2SA838 (C) |
| B-2 | Q8 | | TR | PNP | 2SA608KS) |
| C-2 | Q9 | | TR | PNP | 2SA608KNP (F) |
| C-3 | Q10 | | TR | NPN | 2SC1215 (T or S) |
| C-2 | Q11 | | TR | NPN | 2SC1215 (T or S) |
| C-3 | Q12 | | TR | NPN | 2SC1215 (T or S) |
| C-2 | Q13 | | TR | NPN | 2SC1215 (T or S) |
| C-3 | Q14 | | TR | PNP | 2SA1161 |
| D-3 | Q15 | | TR | NPN | 2SC2499 |
| C-2 | Q16 | | TR | PNP | 2SA1161 |
| C-2 | Q17 | | TR | NPN | 2SC2499 |
| D-3 | Q18 | | TR | NPN | 2SC1215 (T or S) |
| D-3 | Q19 | | TR | NPN | 2SC1215 (T or S) |
| D-2 | Q20 | | TR | NPN | 2SC1215 (T or S) |
| D-2 | Q21 | | TR | NPN | 2SC1215 (T or S) |
| | Q22 | No use | | | |
| D-3 | Q23 | | TR | NPN | 2SC1215 (T or S) |
| D-3 | Q24 | | TR | NPN | 2SC1215 (T or S) |
| D-3 | Q25 | | TR | NPN | 2SC1215 (T or S) |
| D-3 | Q26 | | TR | NPN | 2SC1215 (T or S) |
| E-3 | Q27 | | TR | NPN | 2SC1215 (T or S) |

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | |
|---|---|---|---|---|---|
| E-3 | Q28 | | TR | NPN | 2SC1215 (T or S) |
| E-3 | Q29 | | TR | PNP | 2SA1161 |
| E-3 | Q30 | | TR | NPN | 2SC2499 |
| D-3 | Q31 | | TR | NPN | 2SC1215 (T or S) |
| D-3 | Q32 | | TR | NPN | 2SC1215 (T or S) |
| D-2 | Q33 | | TR | PNP | 2SA608KNP (F) |
| D-2 | Q34 | | TR | NPN | 2SC536KNP (F) |
| E-2 | Q35 | | TR | NPN | 2SC1047 (C) |
| E-2 | Q36 | | TR | NPN | 2SC1047 (C) |
| D-2 | Q37 | | TR | PNP | 2SA608KNP (F) |
| E-2 | Q38 | | TR | NPN | 2SC1215 (T or S) |
| E-2 | Q39 | | TR | NPN | 2SC1215 (T or S) |
| D-2 | Q40 | | TR | PNP | 2SA1161 |
| D-2 | Q41 | | TR | NPN | 2SC2499 |
| E-2 | Q42 | | TR | NPN | 2SC1215 (T or S) |
| E-2 | Q43 | | TR | NPN | 2SC1215 (T or S) |
| E-2 | Q44 | | TR | PNP | 2SA1161 |
| E-2 | Q45 | | TR | PNP | 2SA1161 |
| B-2 | Q46 | | TR | NPN | 2SC536KNP (F) |
| B-2 | Q47 | | TR | NPN | 2SC536KNP (F) |
| B-2 | Q48 | | TR | NPN | 2SC536KNP (F) |
| B-2 | Q49 | | TR | NPN | 2SC536KNP (F) |
| B-1 | Q50 | | TR | NPN | 2SC1215 (T or S) |
| B-1 | Q51 | | TR | NPN | 2SC1215 (T or S) |
| C-2 | Q52 | | TR | PNP | 2SA838 (C) |
| C-1 | Q53 | | TR | PNP | 2SA838 (C) |
| C-2 | Q54 | | TR | PNP | 2SA838 (C) |
| C-1 | Q55 | | TR | PNP | 2SA838 (C) |
| C-2 | Q56 | | TR | PNP | 2SA608KNP (F) |
| C-2 | Q57 | | TR | PNP | 2SA608KNP (F) |
| C-2 | Q58 | | TR | NPN | 2SC1215 (T or S) |
| C-1 | Q59 | | TR | NPN | 2SC1215 (T or S) |
| C-1 | Q60 | | TR | NPN | 2SC1215 (T or S) |
| C-1 | Q61 | | TR | NPN | 2SC1215 (T or S) |
| C-2 | Q62 | | TR | PNP | 2SA1161 |
| C-2 | Q63 | | TR | NPN | 2SC2499 |
| D-1 | Q64 | | TR | NPN | 2SC1215 (T or S) |
| D-2 | Q65 | | TR | NPN | 2SC1215 (T or S) |
| D-1 | Q66 | | TR | NPN | 2SC1215 (T or S) |
| D-1 | Q67 | | TR | NPN | 2SC1215 (T or S) |
| D-1 | Q68 | | TR | NPN | 2SC1215 (T or S) |
| D-1 | Q69 | | TR | NPN | 2SC1215 (T or S) |
| D-1 | Q70 | | TR | NPN | 2SC1215 (T or S) |
| D-1 | Q71 | | TR | NPN | 2SC1215 (T or S) |
| E-1 | Q72 | | TR | NPN | 2SC1215 (T or S) |
| E-1 | Q73 | | TR | NPN | 2SC1215 (T or S) |
| E-1 | Q74 | | TR | PNP | 2SA1161 |
| E-1 | Q75 | | TR | PNP | 2SA2499 |
| D-1 | Q76 | | TR | NPN | 2SC1215 (T or S) |
| D-1 | Q77 | | TR | NPN | 2SC1215 (T or S) |
| E-2 | Q78 | | TR | NPN | 2SC536KNP (F) |
| A-2 | Q79 | | TR | NPN | 2SC536KNP (F) |
| B-3 | IC1 | | IC | Linear | CA3102E |
| B-1 | IC2 | | IC | Linear | CA3102E |
| E-3 | IC3 | | IC | Digital | SN74LS32N |
| E-2 | IC4 | | IC | Digital | SN74LS11N |
| E-2 | IC5 | | IC | Digital | SN74LS112AN |
| E-1 | IC6 | | IC | Digital | SN74LS08N |
| E-1 | IC7 | | IC | Digital | SN74LS00N |
| A-2 | TH1 | | Thermistor | | SDT-1000 |
| A-3 | P3 | E40-0618-05 | Pin connector | | 6P |
| A-1 | P4 | E40-0618-05 | Pin connector | | 6P |
| F-2 | P5 | E40-1276-05 | Pin connector | | 12P |
| | P6 | No use | | | |

# PARTS LIST

X73-1320-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| B-2 | P7 | E40-0576-05 | Pin connector 5P |
| C-2 | P8 | E40-0576-05 | Pin connector 5P |
| E-2 | P9 | E40-0376-05 | Pin connector 3P |
| | P10 | No use | |
| E-1 | P11 | E40-0476-05 | Pin connector 4P |
| E-1 | P12 | E40-0476-05 | Pin connector 4P |
| | P13 | No use | |
| F-2 | P14 | E40-0776-05 | Pin connector 7P |
| D-3 | P15 | E40-0276-05 | Pin connector 2P |
| D-2 | P16 | E40-0276-05 | Pin connector 2P |
| F-3 | P17 | E40-0276-05 | Pin connector 2P |
| F-1 | P18 | E40-0276-05 | Pin connector 2P |
| D-1 | P19 | E40-0276-05 | Pin connector 2P |
| F-1 | P20 | E40-0576-05 | Pin connector 5P |
| D-2 | P21 | E40-0276-05 | Pin connector 2P |
| D-2 | TP | E40-0211-05 | Pin connector 2P |
| | | L92-0110-05 | Core (beads type) |
| | | J25-2973-03 | Printed circuit board |

## VERTICAL OUTPUT AMPLIFIER UNIT X73-1330-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| E-3 | R1 | RN14BK2B91ROF | RN | 91Ω | ±1% | 1/8W |
| E-3 | R2 | RN14BK2B91ROF | RN | 91Ω | ±1% | 1/8W |
| E-2 | R3 | RD14BB2C220J | RD | 22Ω | | |
| E-3 | R4 | RD14BB2C220J | RD | 22Ω | | |
| D-2 | R5 | RD14BB2C100J | RD | 10Ω | | |
| | R6 | No use | | | | |
| E-2 | R7 | RD14BB2C332J | RD | 3.3kΩ | | |
| E-2 | R8 | RN14BK2B27ROF | RN | 27Ω | ±1% | 1/8W |
| D-2 | R9 | RN14BK2B27ROF | RN | 27Ω | ±1% | 1/8W |
| D-2 | R10 | RD14BB2C220J | RD | 22Ω | | |
| D-3 | R11 | RD14BB2C220J | RD | 22Ω | | |
| D-3 | R12 | RD14BB2C302J | RD | 3kΩ | | |
| D-2 | R13 | RD14BB2C122J | RD | 1.2kΩ | | |
| D-2 | R14 | RD14BB2C220J | RD | 22Ω | | |
| D-3 | R15 | RD14BB2C220J | RD | 22Ω | | |
| D-2 | R16 | RN14BK2E6200F | RN | 620Ω | ±1% | 1/4W |
| D-3 | R17 | RN14BK2E6200F | RN | 620Ω | ±1% | 1/4W |
| C-2 | R18 | RD14BB2C220J | RD | 22Ω | | |
| C-3 | R19 | RD14BB2C220J | RD | 22Ω | | |
| D-3 | R20 | RD14BB2C470J | RD | 47Ω | | |
| D-3 | R21 | RD14BB2C220J | RD | 22Ω | | |
| D-3 | R22 | RD14BB2C151J | RD | 150Ω | | |
| | R23 | No use | | | | |
| | R24 | No use | | | | |
| C-2 | R25 | RD14BB2C102J | RD | 1kΩ | | |
| C-3 | R26 | RD14BB2C822J | RD | 8.2kΩ | | |
| C-2 | R27 | RD14BB2E560J | RD | 56Ω | ±5% | 1/4W |
| C-3 | R28 | RD14BB2E560J | RD | 56Ω | ±5% | 1/4W |
| C-3 | R29 | RS14AB3D820J | RS | 82Ω | ±5% | 2W |
| C-2 | R30 | RD14BB2C100J | RD | 10Ω | | |
| C-3 | R31 | RD14BB2C100J | RD | 10Ω | | |
| C-2 | R32 | RD14BB2C220J | RD | 22Ω | | |
| C-3 | R33 | RD14BB2C220J | RD | 22Ω | | |
| B-2 | R34 | RD14BB2C471J | RD | 470Ω | | |
| B-2 | R35 | RD14BB2C471J | RD | 470Ω | | |
| B-2 | R36 | RD14BB2C471J | RD | 470Ω | | |
| B-3 | R37 | RD14BB2C471J | RD | 470Ω | | |
| B-3 | R38 | RD14BB2C471J | RD | 470Ω | | |
| B-3 | R39 | RD14BB2C471J | RD | 470Ω | | |
| B-2 | R40 | RS14AB3D151J | RS | 150Ω | ±5% | 2W |
| B-2 | R41 | RS14AB3D151J | RS | 150Ω | ±5% | 2W |
| E-3 | R42 | RD14BB2C331J | RD | 330Ω | | |
| E-3 | R43 | RN14BK2B5601F | RN | 5.6kΩ | ±1% | 1/8W |
| D-3 | R44 | RN14BK2B4301F | RN | 4.3kΩ | ±1% | 1/8W |
| D-3 | R45 | RN14BK2B1500F | RN | 150Ω | ±1% | 1/8W |
| B-3 | R46 | RS14AB3D151J | RS | 150Ω | ±5% | 2W |
| B-3 | R47 | RS14AB3D151J | RS | 150Ω | ±5% | 2W |
| | R48 | No use | | | | |
| E-2 | R49 | RN14BK2B3300F | RN | 330Ω | ±1% | 1/8W |
| D-3 | R50 | RD14BB2C101J | RD | 100Ω | | |
| | R51 | No use | | | | |
| | R52 | No use | | | | |
| | R53 | No use | | | | |
| D-2 | R54 | RD14BB2C332J | RD | 3.3kΩ | | |
| D-3 | VR1 | R12-0541-05 | VR | 100Ω | | |
| E-3 | C1 | CK45B1H103K | CK | 0.01μF | ±10% | |
| | C2 | No use | | | | |
| D-3 | C3 | CE04W0J102M | CE | 1000μF | | 6.3WV |
| C-3 | C4 | CK45B1H103K | CK | 0.01μF | ±10% | |
| D-2 | C5 | CK45B1H103K | CK | 0.01μF | ±10% | |
| D-3 | C6 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-2 | C7 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-2 | C8 | CK45B1H103K | CK | 0.01μF | ±10% | |

# PARTS LIST

X73-1330-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| C-3 | C9 | CK45B2H472K | CK 4700pF ±10% 500WV |
| E-2 | C10 | CK45B1H103K | CK 0.01μF ±10% |
| E-3 | C11 | CK45B1H103K | CK 0.01μF ±10% |
| D-2 | C12 | CE04W1J330M | CE 33μF 63WV |
| C-2 | C13 | CK45B2H472K | CK 4700pF ±10% 500WV |
| F-3 | C14 | CE04W1V470M | CE 47μF 35WV |
| F-3 | C15 | CK45B1H103K | CK 0.01μF ±10% |
| E-3 | C16 | CE04W1C470M | CE 47μF 16WV |
| E-3 | C17 | CK45B1H103K | CK 0.01μF ±10% |
| C-2 | C18 | CC45CH1H070D | CC 7pF ±0.5pF |
| C-3 | C19 | CK45B1H152K | CK 1500pF ±10% |
| E-2 | C20 | CC45CH1H100D | CC 10pF ±0.5pF |
| E-2 | C21 | CE04W1C331M | CE 330μF 16WV |
| D-2 | TC1 | C05-0411-05 | TC 10pF |
| | TC2 | No use | |
| C-2 | TC3 | C05-0414-15 | TC 40pF |
| | | | |
| B-2 | L1 | L40-2282-13 | Ferri-inductor 0.22μH |
| A-2 | L2 | L40-2282-13 | Ferri-inductor 0.22μH |
| A-2 | L3 | L40-2282-13 | Ferri-inductor 0.22μH |
| B-3 | L4 | L40-2282-13 | Ferri-inductor 0.22μH |
| A-3 | L5 | L40-2282-13 | Ferri-inductor 0.22μH |
| A-3 | L6 | L40-2282-13 | Ferri-inductor 0.22μH |
| D-2 | L7 | L40-1011-03 | Ferri-inductor 100μH |
| E-2 | L8 | L40-1011-03 | Ferri-inductor 100μH |
| F-2 | L9 | L40-1011-03 | Ferri-inductor 100μH |
| | | | |
| E-2 | Q1 | | TR NPN 2SC2499 |
| E-3 | Q2 | | TR NPN 2SC2499 |
| D-2 | Q3 | | TR NPN 2SC2499 |
| D-3 | Q4 | | TR NPN 2SC2499 |
| D-3 | Q5 | | TR NPN 2SC1047 (C) |
| | Q6 | No use | |
| C-2 | Q7 | | TR NPN 2SC2644 |
| C-3 | Q8 | | TR NPN 2SC2644 |
| C-2 | Q9 | | TR NPN 2SC1164 (O) |
| C-3 | Q10 | | TR NPN 2SC1164 (O) |
| D-3 | Q11 | | TR NPN 2SC536KNP (F) |
| E-3 | Q12 | | TR NPN 2SC536KNP (F) |
| C-2 | Q13 | | TR NPN 2SC2644 |
| C-3 | Q14 | | TR NPN 2SC2644 |
| | | | |
| F-2 | P10 | E40-0377-05 | Pin connector 3P |
| F-3 | P13 | E40-0277-05 | Pin connector 2P |
| E-2 | P20 | E40-0576-05 | Pin connector 5P |
| E-2 | P22 | E40-0776-05 | Pin connector 7P |
| | | E23-0512-05 | Terminal |
| | | | |
| | | F02-0501-04 | Heat sink |
| | | F02-0502-05 | Heat sink |
| | | | |
| | | L92-0110-05 | Core (beads type) |
| | | | |
| | | J25-2974-04 | Printed circuit board |

SWEEP ROTARY UNIT X74-1310-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| C-2 | R1 | RN14BK2B3603F | RN 360kΩ ±1% 1/8W |
| C-2 | R2 | RN14BK2B1203F | RN 120kΩ ±1% 1/8W |
| C-2 | R3 | RN14BK2B3002F | RN 30kΩ ±1% 1/8W |
| C-2 | R4 | RN14BK2B3002F | RN 30kΩ ±1% 1/8W |
| C-2 | R5 | RN14BK2B3602F | RN 36kΩ ±1% 1/8W |
| D-2 | R6 | RN14BK2B1202F | RN 12kΩ ±1% 1/8W |
| D-2 | R7 | RN14BK2B3001F | RN 3kΩ ±1% 1/8W |
| D-2 | R8 | RN14BK2B3001F | RN 3kΩ ±1% 1/8W |
| D-2 | R9 | RN14BK2B3601F | RN 3.6kΩ ±1% 1/8W |
| C-2 | R10 | RD14BB2C124J | RD 120kΩ |
| C-2 | R11 | RD14BB2C393J | RD 39kΩ |
| C-2 | R12 | RD14BB2C203J | RD 20kΩ |
| C-2 | R13 | RD14BB2C123J | RD 12kΩ |
| D-2 | R14 | RD14BB2C392J | RD 3.9kΩ |
| D-2 | R15 | RD14BB2C202J | RD 2kΩ |
| D-2 | R16 | RD14BB2C202J | RD 2kΩ |
| D-2 | R17 | RD14BB2C103J | RD 10kΩ |
| C-1 | R18 | RD14BB2C103J | RD 10kΩ |
| C-2 | R19 | RD14BB2C103J | RD 10kΩ |
| C-3 | R20 | RN14BK2B3603F | RN 360kΩ ±1% 1/8W |
| C-3 | R21 | RN14BK2B1203F | RN 120kΩ ±1% 1/8W |
| C-3 | R22 | RN14BK2B3002F | RN 30kΩ ±1% 1/8W |
| C-3 | R23 | RN14BK2B3002F | RN 30kΩ ±1% 1/8W |
| C-3 | R24 | RN14BK2B3602F | RN 36kΩ ±1% 1/8W |
| D-3 | R25 | RN14BK2B1202F | RN 12kΩ ±1% 1/8W |
| D-3 | R26 | RN14BK2B3001F | RN 3kΩ ±1% 1/8W |
| D-3 | R27 | RN14BK2B3001F | RN 3kΩ ±1% 1/8W |
| D-3 | R28 | RN14BK2B3601F | RN 3.6kΩ ±1% 1/8W |
| C-3 | R29 | RD14BB2C124J | RD 120kΩ |
| C-3 | R30 | RD14BB2C393J | RD 39kΩ |
| C-3 | R31 | RD14BB2C203J | RD 20kΩ |
| C-3 | R32 | RD14BB2C123J | RD 12kΩ |
| D-3 | R33 | RD14BB2C392J | RD 3.9kΩ |
| D-3 | R34 | RD14BB2C202J | RD 2kΩ |
| D-3 | R35 | RD14BB2C202J | RD 2kΩ |
| D-2 | R36 | RD14BB2C103J | RD 10kΩ |
| C-2 | R37 | RD14BB2C103J | RD 10kΩ |
| C-3 | R38 | RD14BB2C103J | RD 10kΩ |
| | | | |
| C-2 | C1 | CK45B1H103K | CK 0.01μF ±10% |
| C-2 | C2 | CK45B1H103K | CK 0.01μF ±10% |
| C-2 | C3 | CK45B1H103K | CK 0.01μF ±10% |
| C-4 | C4 | CK45B1H103K | CK 0.01μF ±10% |
| | | | |
| C-2 | D1 | | Diode Silicon GMA-01 |
| C-2 | D2 | | Diode Silicon GMA-01 |
| C-2 | D3 | | Diode Silicon GMA-01 |
| C-2 | D4 | | Diode Silicon GMA-01 |
| D-2 | D5 | | Diode Silicon GMA-01 |
| D-2 | D6 | | Diode Silicon GMA-01 |
| D-2 | D7 | | Diode Silicon GMA-01 |
| D-2 | D8 | | Diode Silicon GMA-01 |
| C-3 | D9 | | Diode Silicon GMA-01 |
| C-3 | D10 | | Diode Silicon GMA-01 |
| C-3 | D11 | | Diode Silicon GMA-01 |
| C-3 | D12 | | Diode Silicon GMA-01 |
| D-3 | D13 | | Diode Silicon GMA-01 |
| D-3 | D14 | | Diode Silicon GMA-01 |
| D-3 | D15 | | Diode Silicon GMA-01 |
| D-3 | D16 | | Diode Silicon GMA-01 |
| | | | |
| B-3 | P15-19 | E40-0976-05 | Pin connector 9P |
| | | E40-1076-05 | Pin connector 10P |
| B-2 | P40 | E40-0876-05 | Pin connector 8P |
| B-2 | P41 | E40-0876-05 | Pin connector 8P |

# PARTS LIST

X74-1310-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| A-3 | P42 | E40-0476-05 | Pin connector 4P |
| C-3 | P51 | E40-0776-05 | Pin connector 7P |
| B-3 | P57 | E40-0376-05 | Pin connector 3P |
| | | E40-2336-05 | Parallel cable |
| | | J25-2971-03 | Printed circuit board |

TRIG SWEEP UNIT X74-1320-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | |
|---|---|---|---|---|---|
| | 02R1 | No use | | | |
| | R2 | No use | | | |
| | R3 | No use | | | |
| | R4 | No use | | | |
| | R5 | RD14BB2C181J | RD 180Ω | | |
| | R6 | RD14BB2C332J | RD 3.3kΩ | | |
| | R7 | RD14BB2C332J | RD 3.3kΩ | | |
| A-1 | R8 | RD14BB2C222J | RD 2.2kΩ | | |
| B-1 | R9 | RD14BB2C470J | RD 47Ω | | |
| B-1 | R10 | RD14BB2C681J | RD 680Ω | | |
| B-1 | R11 | RD14BB2C511J | RD 510Ω | | |
| B-2 | R12 | RD14BB2C511J | RD 510Ω | | |
| D-2 | R13 | RD14BB2C511J | RD 510Ω | | |
| B-1 | R14 | RD14BB2C182J | RD 1.8kΩ | | |
| B-2 | R15 | RD14BB2C681J | RD 680Ω | | |
| B-2 | R16 | RD14BB2C182J | RD 1.8kΩ | | |
| B-2 | R17 | RD14BB2C681J | RD 680Ω | | |
| B-1 | R18 | RD14BB2C511J | RD 510Ω | | |
| B-2 | R19 | RD14BB2C181J | RD 180Ω | | |
| B-2 | R20 | RD14BB2C181J | RD 180Ω | | |
| B-2 | R21 | RD14BB2C181J | RD 180Ω | | |
| B-2 | R22 | RD14BB2C332J | RD 3.3kΩ | | |
| B-2 | R23 | RD14BB2C152J | RD 1.5kΩ | | |
| B-1 | R24 | RD14BB2C511J | RD 510Ω | | |
| C-1 | R25 | RD14BB2C271J | RD 270Ω | | |
| | R26 | RD14BB2C472J | RD 4.7kΩ | | |
| C-1 | R27 | RD14BB2C101J | RD 100Ω | | |
| C-1 | R28 | RD14BB2C103J | RD 10kΩ | | |
| C-1 | R29 | RD14BB2C271J | RD 270Ω | | |
| C-1 | R30 | RD14BB2C511J | RD 510Ω | | |
| D-1 | R31 | RD14BB2C361J | RD 360Ω | | |
| D-1 | R32 | RD14BB2C152J | RD 1.5kΩ | | |
| C-2 | R33 | RD14BB2C511J | RD 510Ω | | |
| B-3 | R34 | RD14BB2C820J | RD 82Ω | | |
| B-3 | R35 | RD14BB2C820J | RD 82Ω | | |
| B-3 | R36 | RD14BB2C331J | RD 330Ω | | |
| B-3 | R37 | RD14BB2C101J | RD 100Ω | | |
| B-2 | R38 | RD14BB2C331J | RD 330Ω | | |
| B-2 | R39 | RD14BB2C101J | RD 100Ω | | |
| C-1 | R40 | RD14BB2C511J | RD 510Ω | | |
| D-1 | R41 | RD14BB2C361J | RD 360Ω | | |
| D-1 | R42 | RD14BB2C220J | RD 22Ω | | |
| D-2 | R43 | RN14BK2B2401F | RN 2.4kΩ | ±1% | 1/8W |
| D-2 | R44 | RN14BK2B5101F | RN 5.1kΩ | ±1% | 1/8W |
| B-3 | R45 | RD14BB2C470J | RD 47Ω | | |
| B-2 | R46 | RD14BB2C470J | RD 47Ω | | |
| D-1 | R47 | RN14BK2B2401F | RN 2.4kΩ | ±1% | 1/8W |
| E-1 | R48 | RD14BB2C123J | RD 12kΩ | | |
| E-1 | R49 | RN14BK2B1502F | RN 15kΩ | ±1% | 1/8W |
| E-1 | R50 | RN14BK2B1202F | RN 12kΩ | ±1% | 1/8W |
| E-2 | R51 | RN14BK2B1002F | RN 10kΩ | ±1% | 1/8W |
| E-1 | R52 | RN14BK2B4302F | RN 43kΩ | ±1% | 1/8W |
| E-1 | R53 | RD14BB2C103J | RD 10kΩ | | |
| E-1 | R54 | RD14BB2C103J | RD 10kΩ | | |
| E-2 | R55 | RN14BK2B3901F | RN 3.9kΩ | ±1% | 1/8W |
| E-1 | R56 | RN14BK2B3901F | RN 3.9kΩ | ±1% | 1/8W |
| E-1 | R57 | RD14BB2C103J | RD 10kΩ | | |
| E-2 | R58 | RD14BB2C104J | RD 100kΩ | | |
| E-2 | R59 | RD14BB2C103J | RD 10kΩ | | |
| D-2 | R60 | RD14BB2C103J | RD 10kΩ | | |
| E-2 | R61 | RD14BB2C104J | RD 100kΩ | | |
| D-2 | R62 | RD14BB2C103J | RD 10kΩ | | |
| E-2 | R63 | RD14BB2C103J | RD 10kΩ | | |
| D-2 | R64 | RD14BB2C104J | RD 100kΩ | | |
| D-2 | R65 | RD14BB2C103J | RD 10kΩ | | |

# PARTS LIST

X-74-1320-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | |
|---|---|---|---|---|---|
| E-2 | R66 | RD14BB2C103J | RD | 10Ω | |
| D-2 | R67 | RD14BB2C470J | RD | 47Ω | |
| D-2 | R68 | RD14BB2C101J | RD | 100Ω | |
| D-2 | R69 | RD14BB2C101J | RD | 100Ω | |
| D-2 | R70 | RD14BB2C470J | RD | 47Ω | |
| D-2 | R71 | RD14BB2C470J | RD | 47Ω | |
| D-2 | R72 | RD14BB2C101J | RD | 100Ω | |
| D-2 | R73 | RD14BB2C101J | RD | 100Ω | |
| C-2 | R74 | RD14BB2C242J | RD | 2.4kΩ | |
| D-2 | R75 | RD14BB2C101J | RD | 100Ω | |
| C-3 | R76 | RD14BB2C511J | RD | 510Ω | |
| D-2 | R77 | RD14BB2C393J | RD | 39kΩ | |
| D-2 | R78 | RD14BB2C152J | RD | 1.5kΩ | |
| C-2 | R79 | RD14BB2C102J | RD | 1kΩ | |
| C-2 | R80 | RD14BB2C101J | RD | 100Ω | |
| C-1 | R81 | RD14BB2C511J | RD | 510Ω | |
| C-1 | R82 | RD14BB2C511J | RD | 510Ω | |
| C-2 | R83 | RD14BB2C331J | RD | 330Ω | |
| B-1 | R84 | RD14BB2C511J | RD | 510Ω | |
| C-2 | R85 | RD14BB2C222J | RD | 2.2kΩ | |
| D-1 | R86 | RD14BB2C100J | RD | 10Ω | |
| C-2 | R87 | RD14BB2C222J | RD | 2.2kΩ | |
| C-2 | R88 | RD14BB2C273J | RD | 27kΩ | |
| C-2 | R89 | RD14BB2C472J | RD | 4.7kΩ | |
| C-2 | R90 | RD14BB2C102J | RD | 1kΩ | |
| C-2 | R91 | RD14BB2C472J | RD | 4.7kΩ | |
| C-2 | R92 | RD14BB2C302J | RD | 3kΩ | |
| C-2 | R93 | RD14BB2C102J | RD | 1kΩ | |
| C-2 | R94 | RD14BB2C122J | RD | 1.2kΩ | |
| C-1 | R95 | RD14BB2C182J | RD | 1.8kΩ | |
| C-1 | R96 | RD14BB2C152J | RD | 1.5kΩ | |
| C-1 | R97 | RD14BB2C511J | RD | 510Ω | |
| C-2 | R98 | RN14BK2B5100F | RN | 510Ω | ±1% 1/8W |
| C-2 | R99 | RD14BB2C221J | RD | 220Ω | |
| | R100 | No use | | | |
| C-2 | R101 | RN14BK2B4701F | RN | 4.7kΩ | ±1% 1/8W |
| C-2 | R102 | RN14BK2B4701F | RN | 4.7kΩ | ±1% 1/8W |
| C-2 | R103 | RD14BB2C101J | RD | 100Ω | |
| C-2 | R104 | RD14BB2C511J | RD | 510Ω | |
| C-3 | R105 | RD14BB2C511J | RD | 510Ω | |
| C-3 | R106 | RD14BB2C162J | RD | 1.6kΩ | |
| C-3 | R107 | RD14BB2C511J | RD | 510Ω | |
| | R108 | No use | | | |
| C-1 | R109 | RD14BB2C102J | RD | 1kΩ | |
| D-4 | R110 | RD14BB2C103J | RD | 10kΩ | |
| C-3 | R111 | RD14BB2C222J | RD | 2.2kΩ | |
| | R112 | No use | | | |
| C-1 | R113 | RD14BB2C222J | RD | 2.2kΩ | |
| C-4 | R114 | RD14BB2C222J | RD | 2.2kΩ | |
| A-3 | R115 | RD14BB2C222J | RD | 2.2kΩ | |
| B-4 | R116 | RD14BB2C681J | RD | 680Ω | |
| | R117 | RD14BB2C511J | RD | 510Ω | |
| B-4 | R118 | RD14BB2C470J | RD | 47Ω | |
| B-4 | R119 | RD14BB2C511J | RD | 510Ω | |
| B-4 | R120 | RD14BB2C511J | RD | 510Ω | |
| B-4 | R121 | RD14BB2C511J | RD | 510Ω | |
| B-4 | R122 | RD14BB2C182J | RD | 1.8kΩ | |
| B-4 | R123 | RD14BB2C681J | RD | 680Ω | |
| B-4 | R124 | RD14BB2C182J | RD | 1.8kΩ | |
| B-4 | R125 | RD14BB2C681J | RD | 680Ω | |
| B-4 | R126 | RD14BB2C511J | RD | 510Ω | |
| A-4 | R127 | RD14BB2C181J | RD | 180Ω | |
| B-4 | R128 | RD14BB2C181J | RD | 180Ω | |
| B-3 | R129 | RD14BB2C181J | RD | 180Ω | |
| A-4 | R130 | RD14BB2C152J | RD | 1.5kΩ | |
| A-4 | R131 | RD14BB2C332J | RD | 3.3kΩ | |

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | |
|---|---|---|---|---|---|
| B-4 | R132 | RD14BB2C511J | RD | 510Ω | |
| | R133 | No use | | | |
| C-4 | R134 | RD14BB2C101J | RD | 100Ω | |
| C-4 | R135 | RD14BB2C271J | RD | 270Ω | |
| C-4 | R136 | RD14BB2C102J | RD | 1kΩ | |
| C-4 | R137 | RD14BB2C271J | RD | 270Ω | |
| C-4 | R138 | RD14BB2C511J | RD | 510Ω | |
| D-4 | R139 | RD14BB2C361J | RD | 360Ω | |
| D-4 | R140 | RD14BB2C152J | RD | 1.5kΩ | |
| | R141 | No use | | | |
| C-4 | R142 | RD14BB2C511J | RD | 510Ω | |
| D-4 | R143 | RD14BB2C361J | RD | 360Ω | |
| D-3 | R144 | RN14BK2B5101F | RN | 5.1kΩ | ±1% 1/8W |
| D-3 | R145 | RN14BK2B7501F | RN | 7.5kΩ | ±1% 1/8W |
| B-4 | R146 | RD14BB2C511J | RD | 510Ω | |
| D-4 | R147 | RN14BK2B2401F | RN | 2.4kΩ | ±1% 1/8W |
| E-4 | R148 | RD14BB2C123J | RD | 12kΩ | |
| E-4 | R149 | RN14BK2B1502F | RN | 15kΩ | ±1% 1/8W |
| E-4 | R150 | RN14BK2B1202F | RN | 12kΩ | ±1% 1/8W |
| E-4 | R151 | RN14BK2B4302F | RN | 43kΩ | ±1% 1/8W |
| E-4 | R152 | RN14BK2B1002F | RN | 10kΩ | ±1% 1/8W |
| E-4 | R153 | RD14BB2C103J | RD | 10kΩ | |
| E-4 | R154 | RN14BK2B3901F | RN | 3.9kΩ | ±1% 1/8W |
| E-4 | R155 | RN14BK2B3901F | RN | 3.9kΩ | ±1% 1/8W |
| E-4 | R156 | RD14BB2C103J | RD | 10kΩ | |
| E-3 | R157 | RD14BB2C104J | RD | 100kΩ | |
| D-3 | R158 | RD14BB2C103J | RD | 10kΩ | |
| E-3 | R159 | RD14BB2C103J | RD | 10kΩ | |
| E-3 | R160 | RD14BB2C104J | RD | 100kΩ | |
| D-3 | R161 | RD14BB2C103J | RD | 10kΩ | |
| E-3 | R162 | RD14BB2C103J | RD | 10kΩ | |
| D-3 | R163 | RD14BB2C104J | RD | 100kΩ | |
| D-3 | R164 | RD14BB2C103J | RD | 10kΩ | |
| E-3 | R165 | RD14BB2C103J | RD | 10kΩ | |
| D-4 | R166 | RD14BB2C470J | RD | 47Ω | |
| D-3 | R167 | RD14BB2C101J | RD | 100Ω | |
| D-3 | R168 | RD14BB2C101J | RD | 100Ω | |
| D-3 | R169 | RD14BB2C470J | RD | 47Ω | |
| C-3 | R170 | RD14BB2C472J | RD | 4.7kΩ | |
| C-4 | R171 | RD14BB2C122J | RD | 1.2kΩ | |
| C-4 | R172 | RD14BB2C182J | RD | 1.8kΩ | |
| C-4 | R173 | RD14BB2C152J | RD | 1.5kΩ | |
| C-4 | R174 | RD14BB2C511J | RD | 510Ω | |
| D-3 | R175 | RD14BB2C470J | RD | 47Ω | |
| C-3 | R176 | RD14BB2C242J | RD | 2.4kΩ | |
| D-3 | R177 | RD14BB2C622J | RD | 6.2kΩ | |
| D-3 | R178 | RD14BB2C393J | RD | 39kΩ | |
| D-3 | R179 | RD14BB2C101J | RD | 100Ω | |
| D-3 | R180 | RD14BB2C101J | RD | 100Ω | |
| D-3 | R181 | RD14BB2C101J | RD | 100Ω | |
| C-3 | R182 | RD14BB2C102J | RD | 1kΩ | |
| C-3 | R183 | RD14BB2C101J | RD | 100Ω | |
| B-4 | R184 | RD14BB2C511J | RD | 510Ω | |
| C-4 | R185 | RD14BB2C511J | RD | 510Ω | |
| C-4 | R186 | RD14BB2C511J | RD | 510Ω | |
| C-4 | R187 | RD14BB2C222J | RD | 2.2kΩ | |
| C-4 | R188 | RD14BB2C362J | RD | 3.6kΩ | |
| | R189 | RD14BB2C102J | RD | 1kΩ | |
| C-3 | R190 | RD14BB2C162J | RD | 1.6kΩ | |
| C-3 | R191 | RD14BB2C362J | RD | 3.6kΩ | |
| A-3 | R192 | RD14BB2C331J | RD | 330Ω | |
| E-4 | R193 | RD14BB2C103J | RD | 10kΩ | |
| D-4 | R194 | RD14BB2C220J | RD | 22Ω | |
| D-4 | R195 | RD14BB2C100J | RD | 10Ω | |
| F-3 | R196 | RD14BB2C470J | RD | 47Ω | |
| F-3 | R197 | RD14BB2C470J | RD | 47Ω | |

# PARTS LIST

X74-1320-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| F-2 | R198 | RN14BK2B4701F | RN | 4.7kΩ | ±1% | 1/8W |
| F-2 | R199 | RD14BB2C472J | RD | 4.7kΩ | | |
| E-3 | R200 | RN14BK2B3301F | RN | 3.3kΩ | ±1% | 1/8W |
| E-3 | R201 | RN14BK2B1201F | RN | 1.2kΩ | ±1% | 1/8W |
| E-2 | R202 | RD14BB2C392J | RD | 3.9kΩ | | |
| E-3 | R203 | RD14BB2C102J | RD | 1kΩ | | |
| E-2 | R204 | RD14BB2C132J | RD | 1.3kΩ | | |
| E-2 | R205 | RD14BB2C470J | RD | 47Ω | | |
| | R206 | RN14BK2B3301F | RN | 3.3kΩ | ±1% | 1/8W |
| F-2 | R207 | RN14BK2B6201F | RN | 6.2kΩ | ±1% | 1/8W |
| E-2 | R208 | RD14BB2C472J | RD | 4.7kΩ | | |
| F-2 | R209 | RD14BB2C472J | RD | 4.7kΩ | | |
| E-2 | R210 | RN14BK2B4700F | RN | 470Ω | ±1% | 1/8W |
| F-2 | R211 | RN14BK2B4700F | RN | 470Ω | ±1% | 1/8W |
| E-2 | R212 | RN14BK2B2201F | RN | 2.2kΩ | ±1% | 1/8W |
| E-2 | R213 | RD14BB2C621J | RD | 620Ω | | |
| F-2 | R214 | RN14BK2B2201F | RN | 2.2kΩ | ±1% | 1/8W |
| E-2 | R215 | RN14BK2B1601F | RN | 1.6kΩ | ±1% | 1/8W |
| F-2 | R216 | RN14BK2B1601F | RN | 1.6kΩ | ±1% | 1/8W |
| F-2 | R217 | RD14BB2C470J | RD | 47Ω | | |
| F-2 | R218 | RD14BB2C470J | RD | 47Ω | | |
| E-1 | R219 | RN14BK2B1001F | RN | 1kΩ | ±1% | 1/8W |
| E-2 | R220 | RN14BK2B1001F | RN | 1kΩ | ±1% | 1/8W |
| E-2 | R221 | RN14BK2B1500F | RN | 150Ω | ±1% | 1/8W |
| E-1 | R222 | RN14BK2B1001F | RN | 1kΩ | ±1% | 1/8W |
| E-2 | R223 | RN14BK2B1001F | RN | 1kΩ | ±1% | 1/8W |
| E-3 | R224 | RN14BK2B4701F | RN | 4.7kΩ | ±1% | 1/8W |
| E-3 | R225 | RN14BK2B2001F | RN | 2kΩ | ±1% | 1/8W |
| F-1 | R226 | RD14BB2C102J | RD | 1kΩ | | |
| F-2 | R227 | RD14BB2C102J | RD | 1kΩ | | |
| F-1 | R228 | RD14BB2C472J | RD | 47kΩ | | |
| F-2 | R229 | RD14BB2C470J | RD | 47kΩ | | |
| F-2 | R230 | RD14BB2C470J | RD | 47kΩ | | |
| F-2 | R231 | RD14BB2C470J | RD | 47kΩ | | |
| E-2 | R232 | RD14BB2C472J | RD | 4.7kΩ | | |
| E-2 | R233 | RD14BB2C103J | RD | 10kΩ | | |
| E-2 | R234 | RD14BB2C472J | RD | 4.7kΩ | | |
| E-2 | R235 | RD14BB2C103J | RD | 10kΩ | | |
| F-3 | R236 | RD14BB2C470J | RD | 47Ω | | |
| F-3 | R237 | RN14BK2B4701F | RN | 4.7kΩ | ±1% | 1/8W |
| F-3 | R238 | RD14BB2C472J | RD | 4.7kΩ | | |
| E-3 | R239 | RN14BK2B1201F | RN | 1.2kΩ | ±1% | 1/8W |
| E-3 | R240 | RN14BK2B3301F | RN | 3.3kΩ | ±1% | 1/8W |
| E-3 | R241 | RN14BK2B2201F | RN | 2.2kΩ | ±1% | 1/8W |
| C-3 | R242 | RN14BK2B6801F | RN | 6.8kΩ | ±1% | 1/8W |
| C-2 | R243 | RN14BK2B6801F | RN | 6.8kΩ | ±1% | 1/8W |
| F-3 | R244 | RD14BB2C223J | RD | 22kΩ | | |
| F-3 | R245 | RD14BB2C102J | RD | 1kΩ | | |
| F-3 | R246 | RD14BB2C122J | RD | 1.2kΩ | | |
| F-3 | R247 | RD14BB2C751J | RD | 750Ω | | |
| F-3 | R248 | RD14BB2C472J | RD | 4.7kΩ | | |
| B-2 | R249 | RD14BB2C511J | RD | 510Ω | | |
| B-2 | R250 | RD14BB2C511J | RD | 510Ω | | |
| B-2 | R251 | RD14BB2C471J | RD | 470Ω | | |
| A-2 | R252 | RD14BB2C101J | RD | 100Ω | | |
| A-2 | R253 | RD14BB2C331J | RD | 330Ω | | |
| A-2 | R254 | RD14BB2C220J | RD | 22Ω | | |
| A-2 | R255 | RD14BB2C272J | RD | 2.7kΩ | | |
| A-2 | R256 | RD14BB2C470J | RD | 47Ω | | |
| C-3 | R257 | RD14BB2C2R7J | RD | 2.7Ω | | |
| | R258 | No use | | | | |
| B-2 | R259 | RD14BB2C511J | RD | 510Ω | | |
| B-2 | R260 | RD14BB2C511J | RD | 510Ω | | |
| B-2 | R261 | RD14BB2C471J | RD | 470Ω | | |
| A-2 | R262 | RD14BB2C101J | RD | 100Ω | | |
| | R263 | RD14BB2C331J | RD | 330Ω | | |

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | |
|---|---|---|---|---|
| A-2 | R264 | RD14BB2C220J | RD | 22Ω |
| A-2 | R265 | RD14BB2C272J | RD | 2.7kΩ |
| A-2 | R266 | RD14BB2C470J | RD | 47Ω |
| B-2 | R267 | RD14BB2C911J | RD | 910Ω |
| B-2 | R268 | RD14BB2C432J | RD | 4.3kΩ |
| B-3 | R269 | RD14BB2C202J | RD | 2kΩ |
| B-3 | R270 | RD14BB2C102J | RD | 1kΩ |
| B-3 | R271 | RD14BB2C102J | RD | 1kΩ |
| B-3 | R272 | RD14BB2C202J | RD | 2kΩ |
| B-2 | R273 | RD14BB2C222J | RD | 2.2kΩ |
| B-2 | R274 | RD14BB2C222J | RD | 2.2kΩ |
| B-2 | R275 | RD14BB2C511J | RD | 510Ω |
| B-2 | R276 | RD14BB2C511J | RD | 510Ω |
| | R277 | RD14BB2C561J | RD | 560Ω |
| | R278 | No use | | |
| B-2 | R279 | RD14BB2C220J | RD | 22Ω |
| B-2 | R280 | RD14BB2C511J | RD | 510Ω |
| A-2 | R281 | RD14BB2C331J | RD | 330Ω |
| A-2 | R282 | RD14BB2C101J | RD | 100Ω |
| | R283 | No use | | |
| | R284 | RD14BB2C472J | RD | 4.7kΩ |
| C-2 | R285 | RD14BB2C222J | RD | 2.2kΩ |
| B-3 | R286 | RD14BB2C511J | RD | 510Ω |
| B-2 | R287 | RD14BB2C220J | RD | 22Ω |
| A-2 | R288 | RD14BB2C101J | RD | 100Ω |
| A-3 | R289 | RD14BB2C331J | RD | 330Ω |
| C-2 | R290 | RD14BB2C152J | RD | 1.5kΩ |
| A-4 | R291 | RD14BB2C222J | RD | 2.2kΩ |
| | R292 | RD14BB2C472J | RD | 4.7kΩ |
| B-3 | R293 | RD14BB2C222J | RD | 2.2kΩ |
| C-3 | R294 | RD14BB2C511J | RD | 510Ω |
| C-3 | R295 | RD14BB2C220J | RD | 22Ω |
| C-3 | R296 | RD14BB2C101J | RD | 100Ω |
| C-3 | R297 | RD14BB2C331J | RD | 330Ω |
| C-3 | R298 | RD14BB2C220J | RD | 22Ω |
| C-3 | R299 | RD14BB2C910J | RD | 91Ω |
| E-2 | R300 | RD14BB2C102J | RD | 1kΩ |
| | R301 | No use | | |
| E-3 | R302 | RD14BB2C101J | RD | 100Ω |
| | R303 | No use | | |
| | R304 | No use | | |
| E-2 | R305 | RD14BB2C331J | RD | 330Ω |
| E-3 | R306 | RD14BB2C101J | RD | 100Ω |
| E-3 | R307 | RD14BB2C220J | RD | 22Ω |
| E-3 | R308 | RD14BB2C220J | RD | 22Ω |
| E-3 | R309 | RD14BB2C331J | RD | 330Ω |
| | R310 | No use | | |
| D-2 | R311 | RD14BB2C222J | RD | 2.2kΩ |
| | R312 | No use | | |
| | R313 | No use | | |
| | R314 | No use | | |
| B-3 | R315 | RD14BB2C222J | RD | 2.2kΩ |
| A-4 | R316 | RD14BB2C202J | RD | 2kΩ |
| A-3 | R317 | RD14BB2C202J | RD | 2kΩ |
| B-3 | R318 | RD14BB2C222J | RD | 2.2kΩ |
| B-2 | R319 | RD14BB2C511J | RD | 510Ω |
| E-1 | VR1 | R12-3521-05 | VR | 20kΩ |
| E-1 | VR2 | R12-3521-05 | VR | 20kΩ |
| E-4 | VR3 | R12-3521-05 | VR | 20kΩ |
| E-4 | VR4 | R12-3521-05 | VR | 20kΩ |
| C-2 | VR5 | R12-2512-05 | VR | 5kΩ |
| C-2 | VR6 | R12-0539-05 | VR | 200Ω |
| C-2 | VR7 | R12-1517-05 | VR | 1kΩ |
| C-4 | VR8 | R12-1517-05 | VR | 1kΩ |
| F-2 | VR9 | R12-2512-05 | VR | 5kΩ |

# PARTS LIST

X74-1320-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| F-3 | VR10 | R12-2512-05 | VR | 5kΩ | | |
| F-3 | VR11 | R12-1518-05 | VR | 2kΩ | | |
| F-3 | VR12 | R12-1518-05 | VR | 2kΩ | | |
| E-1 | VR13 | R12-0421-05 | VR | 100Ω | | |
| E-2 | VR14 | R12-0539-05 | VR | 200Ω | | |
| F-3 | VR15 | R12-2512-05 | VR | 5kΩ | | |
| | C1 | No use | | | | |
| | C2 | CE04W1C472M | CE | 4700μF | | 16WV |
| C-3 | C3 | CC45SL1H101J | CC | 100pF | ±5% | |
| C-3 | C4 | CK45FB1H103K | CK | 0.01μF | ±5% | |
| B-1 | C5 | CC45SL1H101J | CC | 100pF | ±5% | |
| B-2 | C6 | CE04W1E100M | CE | 10μF | | 25WV |
| | C7 | No use | | | | |
| B-2 | C8 | CE04W1E100M | CE | 10μF | | 25WV |
| D-2 | C9 | CE04W1H010M | CE | 1μF | | 50WV |
| E-2 | C10 | CE04W1V220M | CE | 22μF | | 35WV |
| D-1 | C11 | CE04W1H3R3M | CE | 3.3μF | | 50WV |
| D-2 | C12 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| D-2 | C13 | CE04W1H3R3M | CE | 3.3μF | | 50WV |
| D-2 | C14 | C91-0567-05 | Polyester | 10μF | ±10% | 100WV |
| E-2 | C15 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| E-2 | C16 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| D-2 | C17 | CQ93BP2A104F | CQ | 0.1μF | ±1% | 100WV |
| D-2 | C18 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| D-2 | C19 | CQ93M1H333K | CQ | 0.033μF | ±10% | |
| E-2 | C20 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| D-2 | C21 | CQ93BP2A102F | CQ | 1000pF | ±1% | 100WV |
| D-2 | C22 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| D-2 | C23 | CC45SL1H331J | CC | 330pF | ±5% | |
| D-2 | C24 | CC45SL1H470J | CC | 47pF | ±5% | |
| D-2 | C25 | CM93BD2A680J | CM | 68pF | ±5% | 100WV |
| C-2 | C26 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| C-2 | C27 | CC45CH1H330J | CC | 33pF | ±5% | |
| C-2 | C28 | CE04W1E100M | CE | 10μF | | 25WV |
| C-3 | C29 | CC45SL1H330J | CC | 33pF | ±5% | |
| | C30 | No use | | | | |
| | C31 | No use | | | | |
| B-4 | C32 | CC45SL1H101J | CC | 100pF | ±5% | |
| B-4 | C33 | CE04W1E100M | CE | 10μF | | 25WV |
| B-4 | C34 | CE04W1E100M | CE | 10μF | | 25WV |
| | C35 | No use | | | | |
| D-4 | C36 | CE04W1H3R3M | CE | 3.3μF | | 50WV |
| D-3 | C37 | C91-0567-05 | Polyester | 10μF | ±10% | 100WV |
| C-3 | C38 | CE04W1E100M | CE | 10μF | | 25WV |
| D-3 | C39 | CQ93BP2A104F | CQ | 0.1μF | ±1% | 100WV |
| D-3 | C40 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| D-3 | C41 | CQ93BP2A102F | CQ | 1000pF | ±1% | 100WV |
| D-3 | C42 | CK45B1H102K | CK | 1000pF | ±10% | |
| D-3 | C43 | CC45SL1H101J | CC | 100pF | ±5% | |
| D-4 | C44 | CM93BD2A680J | CM | 68pF | ±5% | 100WV |
| | C45 | No use | | | | |
| F-3 | C46 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| | C47 | CE04W1A100M | CE | 10μF | | 10WV |
| F-2 | C48 | CE04W1C470M | CE | 47μF | | 16WV |
| E-2 | C49 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| E-2 | C50 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| B-2 | C51 | CC45SL1H331J | CC | 330pF | ±5% | |
| B-3 | C52 | CQ93M1H102J | CQ | 1000pF | ±5% | |
| B-3 | C53 | CQ93M1H102J | CQ | 1000pF | ±5% | |
| C-2 | C54 | CE04W1H010M | CE | 1μF | | 50WV |
| C-2 | C55 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| C-3 | C56 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| | C57 | CC45SL1H470J | CC | 47pF | ±5% | |
| | C58 | No use | | | | |
| F-4 | C59 | CK45FB1H103K | CK | 0.01μF | ±10% | |

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| F-4 | C60 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| F-4 | C61 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| F-4 | C62 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| D-2 | C63 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| E-1 | C64 | CK45B2H472K | CK | 4700pF | ±10% | 500WV |
| D-1 | C65 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| F-4 | C66 | CK45B2H472K | CK | 4700pF | ±10% | 500WV |
| D-4 | C67 | CE04W1V220M | CE | 22μF | | 35WV |
| A-2 | C68 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| A-2 | C69 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| A-4 | C70 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| D-1 | C71 | CK45B1H103K | CK | 0.01μF | ±10% | |
| E-4 | C72 | CK45FB2H472K | CK | 4700pFF | ±10% | 500WV |
| D-4 | C73 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| B-2 | C74 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| | C75 | No use | | | | |
| | C76 | No use | | | | |
| B-1 | C77 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| B-1 | C78 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| C-1 | C79 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| B-2 | C80 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| B-2 | C81 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| C-2 | C82 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| B-3 | C83 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| B-3 | C84 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| C-3 | C85 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| B-3 | C86 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| B-3 | C87 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| C-3 | C88 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| B-2 | C89 | C90-0298-05 | SCC | 0.1μF | | 12WV |
| | C90 | No use | | | | |
| | C91 | No use | | | | |
| B-1 | C92 | CE04W1A101M | CE | 100μF | | 10WV |
| B-2 | C93 | CE04W1A101M | CE | 100μF | | 10WV |
| B-3 | C94 | CE04W1A470M | CE | 47μF | | 10WV |
| B-3 | C95 | CE04W1A101M | CE | 100μF | | 10WV |
| | C96 | No use | | | | |
| F-4 | C97 | CE04W1A221M | CE | 220μF | | 10WV |
| D-2 | C98 | CE04W1C470M | CE | 47μF | | 16WV |
| D-3 | C99 | CE04W1C470M | CE | 47μF | | 16WV |
| C-2 | C100 | CE04W1C470M | CE | 47μF | | 16WV |
| C-3 | C101 | CE04W1C331M | CE | 330μF | | 16WV |
| F-3 | C102 | CE04W1C101M | CE | 100μF | | 16WV |
| F-4 | C103 | CE04W1C101M | CE | 100μF | | 16WV |
| D-2 | C104 | CE04W1E220M | CE | 22μF | | 25WV |
| D-3 | C105 | CE04W1E330M | CE | 33μF | | 25WV |
| D-3 | C106 | CE04W1E220M | CE | 22μF | | 25WV |
| F-3 | C107 | CE04W1E101M | CE | 100μF | | 25WV |
| | C108 | No use | | | | |
| | C109 | No use | | | | |
| E-1 | C110 | CE04W1J100M | CE | 10μF | | 63WV |
| E-4 | C111 | CE04W1J100M | CE | 10μF | | 63WV |
| F-2 | C112 | CE04W1C330M | CE | 33μF | | 16WV |
| F-2 | C113 | CE04W1E220M | CE | 22μF | | 25WV |
| A-4 | C114 | CE04W1C330M | CE | 33μF | | 16WV |
| A-2 | C115 | CE04W1C330M | CE | 33μF | | 16WV |
| D-3 | C116 | CE04W1H010M | CE | 1μF | | 50WV |
| | C117 | No use | | | | |
| D-3 | C118 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| D-3 | C119 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| D-3 | C120 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| E-3 | C121 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| E-3 | C122 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| E-3 | C123 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| C-3 | C124 | CK45FB1H103K | CK | 0.01μF | ±10% | |
| | C125 | No use | | | | |

# PARTS LIST

X74-1320-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| | C126 | No use | |
| A-1 | C127 | C90-0298-05 | SCC 0.1μF 12WV |
| A-4 | C128 | C90-0298-05 | SCC 0.1μF 12WV |
| A-2 | C129 | CE04W1C330M | CE 33μF 16WV |
| | C130 | CC45SL1H390J | CC 39pF ±5% |
| D-1 | TC1 | C05-0030-15 | TC 20pF |
| D-4 | TC2 | C05-0030-15 | TC 20pF |
| C-2 | TC3 | C05-0062-05 | TC 6pF |
| C-3 | TC4 | C05-0006205 | TC 6pF |
| D-2 | L1 | L40-1001-01 | Ferri-inductor 10μH |
| D-4 | L2 | L40-1001-01 | Ferri-inductor 10μH |
| B-1 | IC1 | | IC Digital MC10103L |
| B-1 | IC2 | | IC Digital MC10131L |
| D-1 | IC3 | | IC Linear TL082CP |
| B-4 | IC4 | | IC Digital MC10103L |
| B-4 | IC5 | | IC Digital MC10131L |
| D-4 | IC6 | | IC Linear TL082CP |
| C-1 | IC7 | | IC Digital MC10104L |
| C-2 | IC8 | | IC Digital MC10103L |
| C-3 | IC9 | | IC Digital MC10104L |
| C-4 | IC10 | | IC Digital MC10104L |
| B-2 | IC11 | | IC Digital MC10104L |
| B-3 | IC12 | | IC Digital MC10102L |
| B-2 | IC13 | | IC Digital MC10131L |
| A-3 | IC14 | | IC Digital SN7405N |
| B-3 | IC15 | | IC Digital MC10104L |
| D-2 | IC16 | | IC Regulator MC78L15CP |
| | Q1 | No use | |
| | Q2 | No use | |
| B-2 | Q3 | | TR NPN 2SC536KNP (F) |
| B-2 | Q4 | | TR NPN 2SC536KNP (F) |
| C-1 | Q5 | | TR PNP 2SA838 (C) |
| D-1 | Q6 | | TR NPN 2SC1215 (T or S) |
| D-1 | Q7 | | TR NPN 2SC1973 (T) |
| D-1 | Q8 | | TR PNP 2SA838 (C) |
| E-1 | Q9 | | TR NPN 2SD438 (F) |
| E-1 | Q10 | | TR NPN 2SC536KNP (F) |
| E-2 | Q11 | | TR NPN 2SC536KNP (F) |
| E-1 | Q12 | | TR NPN 2SC536KNP (F) |
| D-2 | Q13 | | TR NPN 2SC536KNP (F) |
| E-2 | Q14 | | TR NPN 2SC536KNP (F) |
| D-2 | Q15 | | TR NPN 2SC536KNP (F) |
| E-2 | Q16 | | TR NPN 2SC536KNP (F) |
| D-2 | Q17 | | TR NPN 2SC536KNP (F) |
| E-2 | Q18 | | TR NPN 2SC536KNP (F) |
| D-2 | Q19 | | FET Dual M74F (C) |
| D-2 | Q20 | | TR NPN 2SC1047 (C) |
| D-2 | Q21 | | FET Dual M74F (C) |
| C-2 | Q22 | | TR PNP 2SA8387 (C) |
| D-2 | Q23 | | TR NPN 2SC1407 (C) |
| C-2 | Q24 | | TR NPN 2SC536KNP (F) |
| C-2 | Q25 | | TR NPN 2SC536KNP (F) |
| C-2 | Q26 | | TR NPN 2SC536KNP (F) |
| B-3 | Q27 | | TR PNP 2SA838 (C) |
| B-2 | Q28 | | TR PNP 2SA838 (C) |
| E-2 | Q29 | | TR PNP 2SA838 (C) |
| E-3 | Q30 | | TR PNP 2SA838 (C) |
| | Q31 | No use | |
| B-4 | Q32 | | TR NPN 2SC536KNP (F) |
| A-4 | Q33 | | TR NPN 2SC536KNP (F) |
| C-4 | Q34 | | TR PNP 2SA838 (C) |
| D-4 | Q35 | | TR NPN 2SC1215 (T or S) |

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| D-4 | Q36 | | TR NPN 2SC1973 (T) |
| D-4 | Q37 | | TR PNP 2SA838 (C) |
| E-4 | Q38 | | TR NPN 2SD438 (F) |
| E-4 | Q39 | | TR NPN 2SC536KNP (F) |
| E-4 | Q40 | | TR NPN 2SC536KNP (F) |
| E-4 | Q41 | | TR NPN 2SC536KNP (F) |
| D-3 | Q42 | | TR NPN 2SC536KNP (F) |
| E-3 | Q43 | | TR NPN 2SC536KNP (F) |
| D-3 | Q44 | | TR NPN 2SC536KNP (F) |
| E-3 | Q45 | | TR NPN 2SC536KNP (F) |
| D-3 | Q46 | | TR NPN 2SC536KNP (F) |
| E-3 | Q47 | | TR NPN 2SC536KNP (F) |
| D-4 | Q48 | | FET Dual M74F (C) |
| D-3 | Q49 | | TR NPN 2SC1047 (C) |
| C-3 | Q50 | | TR PNP 2SA838 (C) |
| D-3 | Q51 | | FET Dual M74F (C) |
| D-3 | Q52 | | TR NPN 2SC1047 (C) |
| F-2 | Q53 | | TR NPN 2SC536KNP (F) |
| F-3 | Q54 | | TR NPN 2SC536KNP (F) |
| E-3 | Q55 | | TR NPN 2SC1047 (C) |
| E-3 | Q56 | | TR NPN 2SC1047 (C) |
| E-3 | Q57 | | TR NPN 2SC1047 (C) |
| E-3 | Q58 | | TR NPN 2SC1047 (C) |
| E-3 | Q59 | | TR NPN 2SC1047 (C) |
| E-2 | Q60 | | TR NPN 2SC1047 (C) |
| F-2 | Q61 | | TR NPN 2SC1047(C) |
| E-2 | Q62 | | TR PNP 2SA838 (C) |
| F-2 | Q63 | | TR PNP 2SA838 (C) |
| F-1 | Q64 | | TR NPN 2SC1047 (C) |
| F-2 | Q65 | | TR NPN 2SC1047 (C) |
| F-1 | Q66 | | TR NPN 2SC1047 (C) |
| F-2 | Q67 | | TR NPN 2SC1047 (C) |
| E-2 | Q68 | | TR NPN 2SC536KNP (F) |
| E-2 | Q69 | | TR NPN 2SC536KNP (F) |
| F-1 | Q70 | | TR NPN 2SC1047 (C) |
| F-2 | Q71 | | TR NPN 2SC1047 (C) |
| A-2 | Q72 | | TR PNP 2SA838 (C) |
| A-2 | Q73 | | TR NPN 2SC1215 (T or S) |
| A 2 | Q74 | | TR PNP 2SA838 (C) |
| A-2 | Q75 | | TR NPN 2SC1215 (T or S) |
| A-2 | Q76 | | TR PNP 2SA838 (C) |
| A-3 | Q77 | | TR PNP 2SA838 (C) |
| C-3 | Q78 | | TR PNP 2SA838 (C) |
| C-3 | Q79 | | TR NPN 2SC536KNP (F) |
| C-2 | Q80 | | TR PNP 2SA838 (C) |
| C-2 | Q81 | | TR NPN 2SC536KNP (F) |
| A-1 | D1 | | Diode Varistor SV-03Y |
| B-2 | D2 | | Diode Silicon GMA-01 |
| C-2 | D3 | | Diode Silicon GMA-01 |
| | D4 | | Diode Silicon GMA-01 |
| C-1 | D5 | | Diode Silicon GMA-01 |
| C-1 | D6 | | Diode Silicon DS442X |
| C-1 | D7 | | Diode Silicon DS442X |
| D-1 | D8 | | Diode Silicon GMA-01 |
| D-1 | D9 | | Diode Silicon GMA-01 |
| D-1 | D10 | | Diode Silicon GMA-01 |
| | D11 | | Diode Silicon GMA-01 |
| E-1 | D12 | | Diode Zener WZ-150 |
| E-1 | D13 | | Diode Silicon DS442X |
| | D14 | | Diode Germanium IN60 |
| D-2 | D15 | | Diode Silicon GMA-01 |
| C-2 | D16 | | Diode Silicon GMA-01 |
| | D17 | | Diode Zener YZ-030 |
| | D18 | | Diode Silicon GMA-01 |
| A-4 | D19 | | Diode Varistor SV-03Y |

# PARTS LIST

X74-1320-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| B-4 | D20 | | Diode Silicon GMA-01 |
| | D21 | | Diode Silicon GMA-01 |
| | D22 | | Diode Silicon GMA-01 |
| C-4 | D23 | | Diode Silicon GMA-01 |
| C-4 | D24 | | Diode Silicon DS442X |
| C-4 | D25 | | Diode Silicon GS442X |
| D-4 | D26 | | Diode Silicon GMA-01 |
| | D27 | | Diode Silicon GMA-01 |
| E-4 | D28 | | Diode Zener WZ-150 |
| E-4 | D29 | | Diode Silicon DS442X |
| D-3 | D30 | | Diode Silicon GMA-01 |
| A-3 | D31 | | Diode Silicon GMA-01 |
| A-3 | D32 | | Diode Silicon GMA-01 |
| E-3 | D33 | | Diode Silicon GMA-01 |
| E-3 | D34 | | Diode Silicon GMA-01 |
| E-3 | D35 | | Diode Silicon GMA-01 |
| E-3 | D36 | | Diode Silicon GMA-01 |
| E-2 | D37 | | Diode Zener WZ-120 |
| E-2 | D38 | | Diode Zener WZ-12[illegible] |
| | D39 | | Diode Silicon GMA-01 |
| B-3 | D40 | | Diode Silicon GMA-01 |
| B-3 | D41 | | Diode Silicon GMA-01 |
| B-3 | D42 | | Diode Silicon GMA-01 |
| B-3 | D43 | | Diode Silicon GMA-01 |
| | D44 | | Diode Silicon GMA-01 |
| | D45 | | Diode Varistor SV-06Y |
| A-3 | D46 | | Diode Silicon GMA-01 |
| | D47 | | Diode Silicon GMA-01 |
| A-3 | D48 | | Diode Silicon GMA-01 |
| A-3 | D49 | | Diode Silicon GMA-01 |
| A-3 | D50 | | Diode Silicon GMA-01 |
| C-3 | D51 | | Diode Zener WZ-100 |
| C-2 | D52 | | Diode Silicon GMA-01 |
| E-3 | D53 | | Diode Silicon GMA-01 |
| E-3 | D54 | | Diode Silicon GMA-01 |
| D-4 | D55 | | Diode Silicon GMA-01 |
| D-4 | D56 | | Diode Silicon GMA-01 |
| C-4 | D57 | | Diode Silicon GMA-01 |
| A-3 | D58 | | Diode Silicon GMA-01 |
| C-2 | D59 | | Diode Silicon GMA-01 |
| A-3 | D60 | | Diode Silicon GMA-01 |
| A-3 | D61 | | Diode Silicon GMA-01 |
| B-3 | D62 | | Diode Silicon GMA-01 |
| B-1 | D63 | | Diode Silicon GMA-01 |
| E-1 | D64 | | Diode Silicon GMA-01 |
| E-1 | D65 | | Diode Varistor SV-06Y |
| E-1 | D66 | | Diode Silicon GMA-01 |
| C-3 | P13 | E40-0276-05 | Pin connector 2P |
| A-3 | P14 | E40-0776-05 | Pin connector 7P |
| A-2 | P28 | E40-0476-05 | Pin connector 4P |
| F-1 | P35 | E40-0476-05 | Pin connector 4P |
| F-2 | P37 | E40-0776-05 | Pin connector 7P |
| C-2 | P38 | E40-0376-05 | Pin connector 3P |
| D-2 | P39 | E40-0776-05 | Pin connector 7P |
| E-2 | P40 | E40-0876-05 | Pin connector 8P |
| E-3 | P41 | E40-0876-05 | Pin connector 8P |
| C-3 | P42 | E40-0476-05 | Pin connector 4P |
| F-2 | P43 | E40-0276-05 | Pin connector 2P |
| A-4 | P44 | E40-0276-05 | Pin connector 2P |
| E-4 | P45 | E40-0676-05 | Pin connector 6P |
| A-1 | P46 | E40-0276-05 | Pin connector 2P |
| E-4 | P47 | E40-0476-05 | Pin connector 4P |
| A-3 | P48 | E40-1811-05 | Pin connector 18P |
| F-4 | P49 | E40-0676-05 | Pin connector 6P |
| B-3 | P50 | E40-0476-05 | Pin connector 4P |

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| D-2 | P57 | E40-0376-05 | Pin connector 3P |
| | | J25-2975-03 | Printed circuit board |

# PARTS LIST

## HORIZONTAL OUTPUT AMPLIFIER UNIT X74-1230-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| C-1 | R1 | RD14BB2C272J | RD | 2.7kΩ | | |
| C-3 | R2 | RD14BB2C272J | RD | 2.7kΩ | | |
| C-2 | R3 | RD14BB2C470J | RD | 47Ω | | |
| C-3 | R4 | RD14BB2C470J | RD | 47Ω | | |
| C-2 | R5 | RD14BB2C152J | RD | 1.5kΩ | | |
| C-2 | R6 | RD14BB2H473J | RD | 47kΩ | ±5% | 1/2W |
| C-2 | R7 | RD14BB2H473J | RD | 47kΩ | ±5% | 1/2W |
| D-2 | R8 | RD14BB2C821J | RD | 820Ω | | |
| C-2 | R9 | RD14BB2C821J | RD | 820Ω | | |
| D-2 | R10 | RD14BB2C102J | RD | 1kΩ | | |
| D-2 | R11 | RD14BB2C102J | RD | 1kΩ | | |
| | R12 | No use | | | | |
| | R13 | No use | | | | |
| C-1 | R14 | RS14GB3A223J | RS | 22kΩ | ±5% | 1W |
| C-3 | R15 | RS14GB3A223J | RS | 22kΩ | ±5% | 1W |
| D-1 | R16 | RD14BB2C134J | RD | 130kΩ | | |
| D-3 | R17 | RD14BB2C134J | RD | 130kΩ | | |
| E-2 | R18 | RD14BY2H123J | RD | 12kΩ | ±5% | 1/2W |
| E-2 | R19 | RD14BB2C102J | RD | 1kΩ | | |
| E-2 | R20 | RD14BB2C102J | RD | 1kΩ | | |
| E-1 | R21 | RD14BB2C220J | RD | 22Ω | | |
| E-3 | R22 | RD14BB2C220J | RD | 22Ω | | |
| F-2 | R23 | RD14BB2C471J | RD | 470Ω | | |
| E-2 | R24 | RD14BB2C471J | RD | 470Ω | | |
| B-2 | R25 | RD14BB2C471J | RD | 470Ω | | |
| B-2 | R26 | RD14BB2C472J | RD | 4.7kΩ | | |
| B-2 | R27 | RD14BB2C472J | RD | 4.7kΩ | | |
| B-2 | R28 | RD14BB2C271J | RD | 270Ω | | |
| B-2 | R29 | RD14BB2C512J | RD | 5.1kΩ | | |
| B-1 | VR1 | R12-0541-05 | VR | 100Ω | | |
| C-2 | C1 | CK45B2H472K | CK | 4700pF | ±10% | 500WV |
| D-2 | C2 | CK45B1H103K | CK | 0.01μF | ±10% | |
| | C3 | No use | | | | |
| | C4 | No use | | | | |
| D-2 | C5 | CK45B1H103K | CK | 0.01μF | ±10% | |
| D-2 | C6 | CK45B1H103K | CK | 0.01μF | ±10% | |
| | C7 | No use | | | | |
| | C8 | No use | | | | |
| C-3 | C9 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-1 | C10 | CC45CH2H010C | CC | 1pF | ±0.25pF | 500WV |
| D-1 | C11 | CC45CH2H010C | CC | 1pF | ±0.25pF | 500WV |
| C-3 | C12 | CC45CH2H010C | CC | 1pF | ±0.25pF | 500WV |
| D-3 | C13 | CC45CH2H010C | CC | 1pF | ±0.25pF | 500WV |
| B-3 | C14 | CK45B1H103K | CK | 0.01μF | ±10% | |
| E-2 | C15 | CK45B2H472K | CK | 4700pF | ±10% | 500WV |
| E-2 | C16 | CK45B2H472K | CK | 4700pF | ±10% | 500WV |
| D-2 | C17 | CK45B2H472K | CK | 4700pF | ±10% | 500WV |
| D-3 | C18 | C92-0549-05 | Tantalum | 1μF | | 35WV |
| E-2 | C19 | CK45B1H103K | CK | 0.01μF | ±10% | |
| E-2 | C20 | C91-0549-05 | Tantalum | 1μF | | 35WV |
| F-2 | C21 | CK45B2H472K | CK | 4700pF | ±10% | 500WV |
| B-2 | C22 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-2 | C23 | CE04W1C101M | CE | 100μF | | 16WV |
| B-3 | C24 | CE04W1C101M | CE | 100μF | | 16WV |
| | C25 | No use | | | | |
| B-2 | C26 | CE04W2A100M | CE | 10μF | | 100WV |
| D-2 | C27 | CE04W2C2R2M | CE | 2.2μF | | 160WV |
| D-2 | C28 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-2 | C29 | CC45CH1H070D | CC | 7pF | ±0.5pF | |
| B-2 | L1 | L40-1011-04 | Ferri-inductor | | 100μH | |
| B-3 | L2 | L40-1011-04 | Ferri-inductor | | 100μH | |
| | L3 | No use | | | | |
| B-2 | L4 | L40-1011-04 | Ferri-inductor | | 100μH | |

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | |
|---|---|---|---|---|---|
| B-3 | L5 | L40-1011-04 | Ferri-inductor | | 100μH |
| | D1 | No use | | | |
| | D2 | No use | | | |
| | D3 | No use | | | |
| | D4 | No use | | | |
| | D5 | No use | | | |
| | D6 | No use | | | |
| | D7 | No use | | | |
| | D8 | No use | | | |
| E-2 | D9 | | Diode | Silicon | DS442X |
| E-2 | D10 | | Diode | Silicon | DS442X |
| E-2 | D11 | | Diode | Silicon | DS442X |
| | D12 | No use | | | |
| E-2 | D13 | | Diode | Zener | WZ-050 |
| C-2 | Q1 | | TR | PNP | 2SA838 (C) |
| C-2 | Q2 | | TR | PNP | 2SA838 (C) |
| | Q3 | No use | | | |
| | Q4 | No use | | | |
| D-2 | Q5 | | TR | PNP | 2SA838 (C) |
| D-2 | Q6 | | TR | PNP | 2SA838 (C) |
| D-1 | Q7 | | TR | NPN | 2SC805A-2 (2, 3) |
| D-3 | Q8 | | TR | NPN | 2SC805A-2 (2, 3) |
| E-1 | Q9 | | TR | PNP | 2SA923-2 (2, 3) |
| E-3 | Q10 | | TR | PNP | 2SA923-2 (2, 3) |
| B-2 | Q11 | | TR | NPN | 2SC536KNP (F) |
| B-2 | Q12 | | TR | NPN | 2SC536KNP (F) |
| B-2 | Q13 | | TR | NPN | 2SC536KNP (F) |
| | | E31-0747-05 | Lead wire with connector | | |
| B-2 | P27 | E40-0876-05 | Pin connector | | 8P |
| B-1 | P35 | E40-0476-05 | Pin connector | | 4P |
| B-1 | P36 | E40-0676-05 | Pin connector | | 6P |
| | | F01-0827-04 | Heat sink | | |
| | | J25-2976-04 | Printed circuit board | | |

# PARTS LIST

## HORIZONTAL MODE CONTROL UNIT X77-1130-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| B-1 | R1 | RD14BB2C393J | RD 39kΩ |
| B-1 | R2 | RD14BB2C393J | RD 39kΩ |
| B-1 | R3 | RD14BB2C393J | RD 39kΩ |
| B-1 | R4 | RD14BB2C393J | RD 39kΩ |
| B-1 | R5 | RD14BB2C393J | RD 39kΩ |
| B-1 | R6 | RD14BB2C393J | RD 39kΩ |
| B-2 | R7 | RD14BB2C824J | RD 820kΩ |
| B-1 | R8 | RD14BB2C393J | RD 39kΩ |
| B-2 | R9 | RD14BB2C824J | RD 820kΩ |
| B-1 | R10 | RD14BB2C393J | RD 39kΩ |
| B-2 | R11 | RD14BB2C824J | RD 820kΩ |
| B-1 | R12 | RD14BB2C393J | RD 39kΩ |
| B-1 | R13 | RD14BB2C473J | RD 47kΩ |
| B-1 | R14 | RD14BB2C473J | RD 47kΩ |
| B-1 | R15 | RD14BB2C184J | RD 180kΩ |
| C-1 | R16 | RD14BB2C391J | RD 390Ω |
| C-1 | R17 | RD14BB2C391J | RD 390Ω |
| C-1 | R18 | RD14BB2C391J | RD 390Ω |
| C-1 | R19 | RD14BB2C391J | RD 390Ω |
| C-1 | R20 | RD14BB2C391J | RD 390Ω |
| C-1 | R21 | RD14BB2C391J | RD 390Ω |
| C-2 | R22 | RD14BB2C393J | RD 39kΩ |
| C-2 | R23 | RD14BB2C393J | RD 39kΩ |
| C-2 | R24 | RD14BB2C393J | RD 39kΩ |
| C-2 | R25 | RD14BB2C393J | RD 39kΩ |
| B-2 | R26 | RD14BB2C824J | RD 820kΩ |
| B-2 | R27 | RD14BB2C393J | RD 39kΩ |
| A-2 | R28 | RD14BB2C824J | RD 820kΩ |
| B-2 | R29 | RD14BB2C393J | RD 39kΩ |
| B-2 | R30 | RD14BB2C824J | RD 820kΩ |
| B-2 | R31 | RD14BB2C393J | RD 39kΩ |
| B-1 | R32 | RD14BB2C473J | RD 47kΩ |
| B-1 | R33 | RD14BB2C473J | RD 47kΩ |
| B-1 | R34 | RD14BB2C184J | RD 180kΩ |
| C-2 | R35 | RD14BB2C391J | RD 390Ω |
| C-2 | R36 | RD14BB2C391J | RD 390Ω |
| C-2 | R37 | RD14BB2C391J | RD 390Ω |
| C-2 | R38 | RD14BB2C562J | RD 5.6kΩ |
| C-2 | R39 | RD14BB2C562J | RD 5.6kΩ |
| C-2 | R40 | RD14BB2C562J | RD 5.6kΩ |
| C-2 | R41 | RD14BB2C184J | RD 180kΩ |
| C-2 | R42 | RD14BB2C223J | RD 22kΩ |
| C-1 | R43 | RD14BB2C473J | RD 47kΩ |
| E-1 | R44 | RD14BB2C103J | RD 10kΩ |
| D-2 | R45 | RD14BB2C472J | RD 4.7kΩ |
| D-2 | R46 | RD14BB2C332J | RD 3.3kΩ |
| D-2 | R47 | RD14BB2C272J | RD 2.7kΩ |
| D-2 | R48 | RD14BB2C331J | RD 330Ω |
| C-2 | R49 | RD14BB2C561J | RD 560Ω |
| D-2 | R50 | RD14BB2C272J | RD 2.7kΩ |
| D-2 | R51 | RD14BB2C222J | RD 2.2kΩ |
| | R52 | No use | |
| | R53 | No use | |
| | R54 | No use | |
| | R55 | No use | |
| | R56 | No use | |
| | R57 | No use | |
| | R58 | No use | |
| | R59 | No use | |
| | R60 | No use | |
| | R61 | No use | |
| | R62 | No use | |
| | R63 | No use | |
| | R64 | No use | |
| | R65 | No use | |
| | R66 | No use | |
| | R67 | No use | |
| | R68 | No use | |
| | R69 | No use | |
| E-1 | R70 | RN14BK2B3600F | RN 360Ω ±1% 1/8W |
| E-1 | R71 | RN14BK2B30R0F | RN 30Ω ±1% 1/8W |
| | R72 | No use | |
| E-1 | R73 | RD14BB2C223J | RD 22kΩ |
| E-1 | R74 | RD14BB2C103J | RD 10kΩ |
| E-1 | R75 | RD14BB2C103J | RD 10kΩ |
| E-1 | R76 | RN14BK2B1003F | RN 100kΩ ±1% 1/8W |
| E-1 | R77 | RN14BK2B9102F | RN 91kΩ ±1% 1/8W |
| E-1 | R78 | RD14BB2C472J | RD 4.7kΩ |
| A-3 | R79 | RD14BB2E470J | RD 47Ω ±5% 1/4W |
| B-3 | R80 | RN14BK2H9003F | RN 900kΩ ±1% 1/2W |
| B-3 | R81 | RN14BK2E1113F | RN 111kΩ ±1% 1/4W |
| B-3 | R82 | RD14BB2C560J | RD 56Ω |
| B-3 | R83 | RN14BK2H1004F | RN 1MΩ ±1% 1/2W |
| | R84 | RD14BB2C104J | RD 100kΩ |
| B-2 | R85 | RD14BB2C101J | RD 100Ω |
| B-2 | R86 | RN14BK2B2701F | RN 2.7kΩ ±1% 1/8W |
| B-2 | R87 | RN14BK2B2701F | RN 2.7kΩ ±1% 1/8W |
| B-2 | R88 | RD14BB2C220J | RD 22Ω |
| B-2 | R89 | RD14BB2C220J | RD 22Ω |
| B-2 | R90 | RD14BB2C220J | RD 22Ω |
| B-2 | R91 | RN14BK2B8200F | RN 820Ω ±1% 1/8W |
| B-2 | R92 | RN14BK2B8200F | RN 820Ω ±1% 1/8W |
| B-2 | R93 | RD14BB2C220J | RD 22Ω |
| A-2 | R94 | RN14BK2B39R0F | RN 39Ω ±1% 1/8W |
| A-2 | R95 | RN14BK2B39R0F | RN 39Ω ±1% 1/8W |
| A-2 | R96 | RD14BB2C122J | RD 1.2kΩ |
| C-3 | R97 | RD14BB2E470J | RD 47Ω ±5% 1/4W |
| B-3 | R98 | RN14BK2H9003F | RN 900kΩ ±1% 1/2W |
| B-3 | R99 | RN14BK2E1113F | RN 111kΩ ±1% 1/4W |
| | R100 | No use | |
| C-3 | R101 | RN14BK2H1004F | RN 1MΩ ±1% 1/2W |
| C-2 | R102 | RD14BB2C104J | RD 100kΩ |
| B-2 | R103 | RD14BB2C101J | RD 100Ω |
| B-2 | R104 | RN14BK2B2701F | RN 2.7kΩ ±1% 1/8W |
| B-2 | R105 | RN14BK2B2701F | RN 2.7kΩ ±1% 1/8W |
| B-2 | R106 | RD14BB2C220J | RD 22Ω |
| B-2 | R107 | RD14BB2C220J | RD 22Ω |
| B-2 | R108 | RD14BB2C220J | RD 22Ω |
| B-2 | R109 | RN14BK2B8200F | RN 820Ω ±1% 1/8W |
| B-2 | R110 | RN14BK2B8200F | RN 820Ω ±1% 1/8W |
| B-2 | R111 | RD14BB2C220J | RD 22Ω |
| C-2 | R112 | RN14BK2B39R0F | RN 39Ω ±1% 1/8W |
| C-2 | R113 | RN14BK2B39R0F | RN 39Ω ±1% 1/8W |
| C-2 | R114 | RD14BB2C122J | RD 1.2kΩ |
| | R115 | No use | |
| | R116 | No use | |
| C-1 | R117 | RD14BB2C472J | RD 4.7kΩ |
| D-1 | R118 | RD14BB2C472J | RD 4.7kΩ |
| C-1 | R119 | RD14BB2C472J | RD 4.7kΩ |
| C-1 | R120 | RD14BB2C563J | RD 56kΩ |
| E-1 | VR1 | R12-0542-05 | VR 200Ω |
| E-1 | VR2 | R12-5517-05 | VR 100kΩ |
| | VR3 | No use | |
| | VR4 | No use | |
| B-3 | VR5 | R12-0541-05 | VR 100Ω |
| B-1 | C1 | CC45SL1H101J | CC 100pF ±5% |
| A-1 | C2 | CC45SL1H101J | CC 100pF ±5% |
| A-1 | C3 | CC45SL1H101J | CC 100pF ±5% |
| A-1 | C4 | CC45SL1H101J | CC 100pF ±5% |

# PARTS LIST

X77-1130-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| B-1 | C5 | CC45SL1H101J | CC 100pF ±5% |
| B-1 | C6 | CC45SL1H101J | CC 100pF ±5% |
| B-1 | C7 | CK45FB1H103K | CK 0.01μF ±10% |
| C-2 | C8 | CC45SL1H101J | CC 100pF ±5% |
| C-2 | C9 | CC45SL1H101J | CC 100pF ±5% |
| C-2 | C10 | CC45SL1H101J | CC 100pF ±5% |
| C-2 | C11 | CC45SL1H101J | CC 100pF ±5% |
| B-1 | C12 | CK45FB1H103K | CK 0.01μF ±10% |
| E-2 | C13 | CK45FB1H103K | CK 0.01μF ±10% |
| D-1 | C14 | CK45FB1H103K | CK 0.01μF ±10% |
| D-1 | C15 | CE04W1C471M | CE 470μF 16WV |
| | C16 | No use | |
| | C17 | No use | |
| | C18 | No use | |
| | C19 | No use | |
| | C20 | No use | |
| | C21 | No use | |
| E-1 | C22 | CC45SL1H471J | CC 470pF ±5% |
| | C23 | No use | |
| | C24 | No use | |
| | C25 | No use | |
| E-1 | C26 | CE04W1C471M | CE 470μF 16WV |
| E-1 | C27 | CQ93BP2A472F | CQ 4700pF ±1% 100WV |
| E-1 | C28 | CQ93BP2A472F | CQ 4700pF ±1% 100WV |
| | C29 | CC45CH1H390J | CC 39pF ±5% |
| B-2 | C30 | C91-0501-05 | MF 0.047μF 630WV |
| B-3 | C31 | CK45FB1H103K | CK 0.01μF ±10% |
| B-2 | C32 | CK45FB1H103K | CK 0.01μF ±10% |
| A-2 | C33 | CK45FB1H103K | CK 0.01μF ±10% |
| | C34 | CK45FB1H103K | CK 0.01μF ±10% |
| B-3 | C35 | CC45CH1H390J | CC 39pF ±5% |
| B-1 | C36 | C91-0501-05 | MF 0.047μF 630WV |
| C-2 | C37 | CK45FB1H103K | CK 0.01μF ±10% |
| E-2 | C38 | CE04W1C471M | CE 470μF 16WV |
| E-1 | C39 | CK45FB1H103K | CK 0.01μF ±10% |
| E-2 | C40 | CK45FB1H103K | CK 0.01μF ±10% |
| E-2 | C41 | CE04W1C471M | CE 470μF 16WV |
| E-2 | C42 | CK45FB1H103K | CK 0.01μF ±10% |
| F-2 | C43 | CE04W1C471M | CE 470μF 16WV |
| E-2 | C44 | CK45FB1H103K | CK 0.01μF ±10% |
| F-2 | C45 | CE04W1C471M | CE 470μF 16WV |
| | C46 | No use | |
| | C47 | CC45CH1H100D | CC 10pF ±0.5pF |
| | C48 | CC45CH1H100D | CC 10pF ±0.5pF |
| B-3 | TC1 | C05-0411-05 | TC 10pF |
| B-3 | TC2 | C05-0411-05 | TC 10pF |
| B-3 | TC3 | C05-0410-05 | TC 6pF |
| C-3 | TC4 | C05-0411-05 | TC 10pF |
| B-3 | TC5 | C05-0411-05 | TC 10pF |
| B-3 | TC6 | C05-0410-05 | TC 6pF |
| B-3 | TC7 | C05-0412-05 | TC 20pF |
| E-1 | L1 | L40-4701-03 | Ferri inductor 47μH |
| F-1 | L2 | L40-1011-04 | Ferri inductor 100μH |
| E-1 | L3 | L40-4701-03 | Ferri inductor 47μH |
| F-1 | L4 | L40-1011-03 | Ferri inductor 100μH |
| F-1 | L5 | L40-1011-03 | Ferri inductor 100μH |
| B-3 | RL1 | S51-2502-05 | Relay |
| C-3 | RL2 | S51-2502-05 | Relay |
| B-2 | IC1 | | IC Digital MC14584BCP |
| C-1 | IC2 | | IC Digital MC14069UBCP |
| C-2 | IC3 | | IC Digital MC14001BCP |
| C-1 | IC4 | | IC Digital MC14174BCP |

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| D-1 | IC5 | | IC Digital MC14503BCP |
| D-2 | IC6 | | IC Digital SN7442AN |
| C-2 | IC7 | | IC Digital MC14013BCP |
| D-2 | IC8 | | IC Digital MC14011BCP |
| E-2 | IC9 | | IC Digital SN74LS04N |
| | IC10 | No use | |
| | IC11 | No use | |
| | IC12 | No use | |
| | IC13 | No use | |
| | IC14 | No use | |
| | IC15 | No use | |
| | IC16 | No use | |
| E-2 | IC17 | | IC Regulator MC78L05C |
| B-1 | D1 | | Diode Silicon DS442X |
| B-1 | D2 | | Diode Silicon DS442X |
| B-1 | D3 | | Diode Silicon DS442X |
| B-1 | D4 | | Diode Silicon DS442X |
| B-1 | D5 | | Diode Silicon DS442X |
| B-1 | D6 | | Diode Silicon DS442X |
| A-1 | D7 | | Diode Silicon DS442X |
| A-1 | D8 | | Diode Silicon DS442X |
| B-1 | D9 | | Diode Silicon DS442X |
| B-1 | D10 | | Diode Silicon DS442X |
| B-1 | D11 | | Diode Silicon DS442X |
| B-1 | D12 | | Diode Silicon DS442X |
| C-2 | D13 | | Diode Silicon DS442X |
| C-2 | D14 | | Diode Silicon DS442X |
| C-2 | D15 | | Diode Silicon DS442X |
| B-1 | D16 | | Diode Silicon DS442X |
| B-1 | D17 | | Diode Silicon DS442X |
| D-1 | D18 | | Diode Silicon DS442X |
| D-1 | D19 | | Diode Silicon DS442X |
| D-1 | D20 | | Diode Silicon DS442X |
| D-2 | D21 | | Diode Silicon DS442X |
| D-2 | D22 | | Diode Silicon DS442X |
| D-2 | D22 | | Diode Silicon DS442X |
| D-2 | D23 | | Diode Silicon DS442X |
| | D24 | No use | |
| | D25 | No use | |
| | D26 | No use | |
| | D27 | No use | |
| | D28 | No use | |
| | D29 | No use | |
| | D30 | No use | |
| D-1 | D31 | | Diode Silicon DS442X |
| | D32 | No use | |
| | D33 | No use | |
| | D34 | No use | |
| | D35 | No use | |
| | D36 | No use | |
| | D37 | No use | |
| E-1 | D38 | | Diode Gerumanium IN60 |
| E-1 | D39 | | Diode Silicon DS442X |
| E-1 | D40 | | Diode Silicon DS442X |
| B-2 | D41 | | Diode Silicon 1S1544A |
| B-2 | D42 | | Diode Silicon DS442X |
| B-2 | D43 | | Diode Silicon DS442X |
| B-2 | D44 | | Diode Silicon DS442X |
| B-2 | D45 | | Diode Silicon DS442X |
| A-3 | D46 | | Diode Silicon DS442X |
| B-2 | D47 | | Diode Silicon 1S1544A |
| C-2 | D48 | | Diode Silicon DS442X |
| C-2 | D49 | | Diode Silicon DS442X |
| C-2 | D50 | | Diode Silicon DS442X |
| C-2 | D51 | | Diode Silicon DS442X |

# PARTS LIST

X77-1130-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| C-3 | D52 | | Diode Silicon DS442X |
| B-2 | D53 | | Diode Silicon DS442X |
| B-2 | D54 | | Diode Silicon DS442X |
| C-2 | Q1 | | TR NPN 2SC536KNP (F) |
| C-2 | Q2 | | TR NPN 2SC536KNP (F) |
| C-2 | Q3 | | TR NPN 2SC536KNP (F) |
| D-1 | Q4 | | TR NPN 2SC536KNP (F) |
| D-2 | Q5 | | TR PNP 2SA608KNP (F) |
| D-2 | Q6 | | TR PNP 2SA608KNP (F) |
| D-2 | Q7 | | TR NPN 2SC536KNP (F) |
| | Q8 | No use | |
| | Q9 | No use | |
| E-1 | Q10 | | TR PNP 2SA608KNP (F) |
| E-1 | Q11 | | TR PNP 2SA608KNP( F) |
| E-1 | Q12 | | TR PNP 2SA608KNP (F) |
| B-2 | Q13 | | FET Dual DN1901 |
| B-2 | Q14 | | TR NPN 2SC1215 (T or S) |
| B-2 | Q15 | | TR NPN 2SC1215 (T or S) |
| A-2 | Q16 | | TR NPN 2SD438 (F) |
| B-2 | Q17 | | FED Dual DN1901 |
| B-2 | Q18 | | TR NPN 2SC1215 (T or S) |
| B-2 | Q19 | | TR NPN 2SC1215 (T or S) |
| C-2 | Q20 | | TR NPN 2SD438 (F) |
| D-1 | P6 | E40-0576-05 | Pin connector 5P |
| A-2 | P11 | E40-0477-05 | Pin connector 4P |
| C-2 | P12 | E40-0476-05 | Pin connector 4P |
| F-1 | P36 | E40-0676-05 | Pin connector 6P |
| D-3 | P48 | E40-1811-05 | Pin connector 18P |
| F-1 | P49 | E40-0676-05 | Pin connector 6P |
| E-1 | P52 | E40-0276-05 | Pin connector 2P |
| E-1 | P53 | E40-0276-05 | Pin connector 2P |
| C-3 | P54 | E40-1211-05 | Pin connector 12P |
| B-1 | P55 | E40-1511-05 | Pin connector 15P |
| A-3 | P56 | E40-0277-05 | Pin connector 2P |
| C-1 | TP1 | E23-0508-04 | Test terminal |
| E-1 | TP2 | E40-0211-05 | Pin connector 2P |
| | | E23-0503-05 | Terminal |
| | | J25-2980-03 | Printed circuit board |

A TRIGGER SWITCH UNIT X77-1110-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| B-1 | R1 | RD14BB2C510J | RD 51Ω |
| B-1 | R2 | RD14BB2C101J | RD 100Ω |
| B-2 | R3 | RD14BB2C101J | RD 100Ω |
| A-2 | R4 | RD14BB2C510J | RD 51Ω |
| | R5 | No use | |
| C-1 | R6 | RD14BB2C103J | RD 10kΩ |
| C-3 | R7 | RD14BB2C473J | RD 47kΩ |
| B-3 | R8 | RD14BB2C473J | RD 47kΩ |
| C-4 | R9 | RN14BK2B4702F | RN 47kΩ ±1% 1/8W |
| C-4 | R10 | RN14BK2B1003F | RN 100kΩ ±1% 1/8W |
| C-4 | R11 | RN14BK2B1003F | RN 100kΩ ±1% 1/8W |
| C-4 | R12 | RN14BK2B4702F | RN 47kΩ ±1% 1/8W |
| B-4 | R13 | RD14BB2C103J | RD 10kΩ |
| B-4 | R14 | RD14BB2C103J | RD 10kΩ |
| C-3 | R15 | RD14BB2C471J | RD 470Ω |
| | R16 | No use | |
| C-2 | R17 | RD14BB2C123J | RD 12kΩ |
| C-2 | R18 | RD14BB2C103J | RD 10kΩ |
| C-2 | R19 | RD14BB2C103J | RD 10kΩ |
| D-1 | R20 | RD14BB2C473J | RD 47kΩ |
| D-1 | R21 | RD14BB2C223J | RD 22kΩ |
| C-3 | R22 | RD14BB2C220J | RD 22Ω |
| C-3 | R23 | RD14BB2C101J | RD 100Ω |
| C-3 | R24 | RD14BB2E105J | RD 1MΩ ±5% 1/4W |
| D-3 | R25 | RD14BB2E105J | RD 1MΩ ±5% 1/4W |
| D-3 | R26 | RN14BK2B3001F | RN 3kΩ ±1% 1/8W |
| D-3 | R27 | RN14BK2B3001F | RN 3kΩ ±1% 1/8W |
| D-3 | R28 | RD14BB2C220J | RD 22Ω |
| D-3 | R29 | RD14BB2C220J | RD 22Ω |
| D-3 | R30 | RD14BB2C562J | RD 5.6kΩ |
| D-3 | R31 | RD14BB2C562J | RD 5.6kΩ |
| D-3 | R32 | RN14BK2B2200F | RN 220Ω ±1% 1/8W |
| D-3 | R33 | RN14BK2B2200F | RN 220Ω ±1% 1/8W |
| C-1 | R34 | RN14BK2B1501F | RN 1.5kΩ ±1% 1/8W |
| E-2 | R35 | RN14BK2B1001F | RN 1kΩ ±1% 1/8W |
| C-1 | R36 | RN14BK2B7500F | RN 750Ω ±1% 1/8W |
| C-1 | R37 | RN14BK2B2700F | RN 270Ω ±1% 1/8W |
| E-2 | R38 | RN14BK2B2700F | RN 270Ω ±1% 1/8W |
| C-1 | R39 | RD14BB2C220J | RD 22Ω |
| C-1 | R40 | RD14BB2C220J | RD 22Ω |
| E-2 | R41 | RD14BB2C100J | RD 10Ω |
| E-1 | R42 | RD14BB2C680J | RD 68Ω |
| E-2 | R43 | RD14BB2C680J | RD 68Ω |
| E-2 | R44 | No use | |
| E-2 | R45 | No use | |
| D-1 | R46 | RD14BB2C220J | RD 22Ω |
| D-2 | R47 | RD14BB2C220J | RD 22Ω |
| D-2 | R48 | RD14BB2C473J | RD 47kΩ |
| D-2 | R49 | RD14BB2C473J | RD 47kΩ |
| D-2 | R50 | RD14BB2C220J | RD 22Ω |
| D-2 | R51 | RD14BB2C220J | RD 22Ω |
| D-2 | R52 | RD14BB2C271J | RD 270Ω |
| D-2 | R53 | RD14BB2C271J | RD 270Ω |
| D-2 | R54 | RD14BB2C102J | RD 1kΩ |
| C-2 | R55 | RD14BB2C220J | RD 22Ω |
| C-2 | R56 | RD14BB2C470J | RD 47Ω |
| | R57 | No use | |
| | R58 | RD14BB2C103J | RD 10kΩ |
| | R59 | RD14BB2C243J | RD 24kΩ |
| | R60 | RD14BB2C363J | RD 36kΩ |
| B-3 | VR1 | R01-2510-05 | VR (attached S3a, b, 4) 5kΩ |
| B-3 | VR2 | R12-3516-05 | VR 10kΩ |
| B-4 | VR3 | R12-0532-05 | VR 100Ω |
| E-3 | VR4 | R12-1519-05 | VR 1kΩ |

# PARTS LIST

X77-1110-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| B-1 | C1 | C91-0502-05 | MF 0.01μF 630WV |
| B-3 | C2 | CC45CH1H680J | CC 68pF ±5% |
| B-3 | C3 | CC45CH1H680J | CC 68pF ±5% |
| C-4 | C4 | CE04BW1E100M | CE 10μF 25WV |
| C-4 | C5 | CE04BW1E100M | CE 10μF 25WV |
| C-3 | C6 | CK45B1H103K | CK 0.01μF ±10% |
| C-2 | C7 | CE04W1H3R3M | CE 3.3μF 50WV |
| C-2 | C8 | CK45B1H103K | CK 0.01μF ±10% |
| D-3 | C9 | CC45CH1H220J | CC 22pF ±5% |
| D-3 | C10 | CC45CH1H220J | CC 22pF ±5% |
| | C11 | No use | |
| | C12 | No use | |
| D-2 | C13 | CC45CH1H220J | CC 22pF ±5% |
| D-4 | C14 | CK45B1H103K | CK 0.01μF ±10% |
| B-3 | C15 | C91-0549-05 | Tantalum 1μF 35WV |
| D-4 | C16 | CE04W1C330M | CE 33μF 16WV |
| D-4 | C17 | CE04W1C330M | CE 33μF 16WV |
| D-4 | C18 | CK45B1H103K | CK 0.01μF ±10% |
| D-3 | C19 | CK45B1H103K | CK 0.01μF ±10% |
| D-1 | C20 | CK45B1H103K | CK 0.01μF ±10% |
| E-1 | C21 | CK45B1H103K | CK 0.01μF ±10% |
| D-3 | C22 | CK45B1H103K | CK 0.01μF ±10% |
| B-4 | C23 | C91-0549-05 | Tantalum 1μF 35WV |
| E-4 | C24 | CE04W1C330M | CE 33μF 16WV |
| E-3 | C25 | CE04W1C330M | CE 33μF 16WV |
| C-2 | C26 | CK45B1H103K | CK 0.01μF ±10% |
| D-2 | C27 | CK45B1H103K | CK 0.01μF ±10% |
| E-2 | C28 | CK45B1H103K | CK 0.01μF ±10% |
| | C29 | No use | |
| D-2 | C30 | CK45B1H103K | CK 0.01μF ±10% |
| E-2 | TC1 | C05-0412-05 | TC 20pF |
| D-3 | L1 | L40-2201-03 | Ferri-inductor 22μH |
| E-3 | L2 | L40-2201-03 | Ferri-inductor 22μH |
| C-2 | D1 | | Diode Silicon DS442X |
| E-1 | D2 | | Diode Silicon DS442X |
| E-2 | D3 | | Diode Silicon DS442X |
| E-1 | D4 | | Diode Silicon DS442X |
| E-2 | D5 | | Diode Silicon DS442X |
| C-4 | Q1 | | FET P-channel 2SJ43 (Q) |
| C-4 | Q2 | | FET N-channel 2SK127 (Q) |
| C-2 | Q3 | | TR NPN 2SC536KNP (F) |
| C-2 | Q4 | | TR NPN 2SC536KNP (F) |
| C-3 | Q5 | | FET Dual DN1901 |
| D-3 | Q6 | | TR NPN 2SC1215 (T or S) |
| D-3 | Q7 | | TR NPN 2SC1215 (T or S) |
| D-2 | Q8 | | TR PNP 2SA1161 |
| E-2 | Q9 | | TR PNP 2SA1161 |
| C-2 | Q10 | | TR NPN 2SC2499 |
| D-2 | IC1 | | IC Linear CA3102E |
| B-1 | P15 | E40-1077-05 | Pin connector 10P |
| C-1 | P46 | E40-0276-05 | Pin connector 2P |
| E-2 | P47 | E40-0476-05 | Pin connector 4P |
| | | J25-2978-04 | Printed circuit board |

B TRIGGER SWITCH UNIT X77-1120-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| C-3 | R1 | RD14BB2C101J | RD 100Ω |
| C-3 | R2 | RD14BB2C101J | RD 100Ω |
| E-3 | R3 | RD14BB2C103J | RD 10kΩ |
| B-2 | R4 | RD14BB2C473J | RD 47kΩ |
| B-3 | R5 | RD14BB2C473J | RD 47kΩ |
| B-2 | R6 | RD14BB2C103J | RD 10kΩ |
| B-2 | R7 | RD14BB2C103J | RD 10kΩ |
| C-2 | R8 | RD14BB2C471J | RD 470Ω |
| C-3 | R9 | RD14BB2C220J | RD 22Ω |
| C-2 | R10 | RD14BB2C101J | RD 100Ω |
| C-3 | R11 | RD14BB2E105J | RD 1MΩ ±5% 1/4W |
| C-2 | R12 | RD14BB2E105J | RD 1MΩ ±5% 1/4W |
| C-3 | R13 | RN14BK2B3001F | RN 3kΩ ±1% 1/8W |
| C-3 | R14 | RN14BK2B3001F | RN 3kΩ ±1% 1/8W |
| C-2 | R15 | RD14BB2C220J | RD 22Ω |
| C-2 | R16 | RD14BB2C220J | RD 22Ω |
| C-2 | R17 | RD14BB2C562J | RD 5.6kΩ |
| C-2 | R18 | RD14BB2C562J | RD 5.6kΩ |
| C-2 | R19 | RN14BK2B2200F | RN 220Ω ±1% 1/8W |
| C-2 | R20 | RN14BK2B2200F | RN 220Ω ±1% 1/8W |
| D-2 | R21 | RN14BK2B1501F | RN 1.5kΩ ±1% 1/8W |
| D-2 | R22 | RN14BK2B1501F | RN 1.5kΩ ±1% 1/8W |
| D-2 | R23 | RN14BK2B7500F | RN 750Ω ±1% 1/8W |
| D-2 | R24 | RN14BK2B2700F | RN 270Ω ±1% 1/8W |
| D-2 | R25 | RN14BK2B2700F | RN 270Ω ±1% 1/8W |
| D-2 | R26 | RD14BB2C220J | RD 22Ω |
| D-2 | R27 | RD14BB2C220J | RD 22Ω |
| E-2 | R28 | RD14BB2C100J | RD 10Ω |
| E-2 | R29 | RD14BB2C680J | RD 68Ω |
| E-2 | R30 | RD14BB2C680J | RD 68Ω |
| | R31 | No use | |
| | R32 | No use | |
| D-2 | R33 | RD14BB2C220J | RD 22Ω |
| D-2 | R34 | RD14BB2C220J | RD 22Ω |
| D-2 | R35 | RD14BB2C473J | RD 47kΩ |
| D-2 | R36 | RD14BB2C473J | RD 47kΩ |
| D-2 | R37 | RD14BB2C220J | RD 22Ω |
| D-2 | R38 | RD14BB2C220J | RD 22Ω |
| D-2 | R39 | RD14BB2C271J | RD 270Ω |
| D-2 | R40 | RD14BB2C271J | RD 270Ω |
| D-3 | R41 | RD14BB2C220J | RD 22Ω |
| D-3 | R42 | RD14BB2C470J | RD 47Ω |
| C-3 | R43 | RD14BB2C510J | RD 51Ω |
| C-3 | R44 | RD14BB2C222J | RD 2.2kΩ |
| D-3 | R45 | RD14BB2C470J | RD 47Ω |
| C-3 | R46 | RD14BB2C821J | RD 820Ω |
| C-2 | VR1 | R01-2511-05 | VR 5kΩ |
| B-2 | VR2 | R12-3516-05 | VR 10kΩ |
| E-2 | VR3 | R12-0532-05 | VR 100Ω |
| B-3 | C1 | C91-0502-05 | MF 0.01μF 630WV |
| B-3 | C2 | CC45CH1H680J | CC 68pF ±5% |
| B-3 | C3 | CC45CH1H680J | CC 68pF ±5% |
| C-2 | C4 | CK45B1H103K | CK 0.01μF ±10% |
| C-2 | C5 | CC45CH1H220J | CC 22pF ±5% |
| C-2 | C6 | CC45CH1H220J | CC 22pF ±5% |
| | C7 | No use | |
| | C8 | No use | |
| D-3 | C9 | CK45B1H103K | CK 0.01μF ±10% |
| C-3 | C10 | CK45B1H103K | CK 0.01μF ±10% |
| B-2 | C11 | C91-0549-05 | Tantalum 1μF 35WV |
| E-3 | C12 | CE04W1C330M | CE 33μF 16WV |
| E-3 | C13 | CE04W1C330M | CE 33μF 16WV |
| E-3 | C14 | CK45B1H103K | CK 0.01μF ±10% |

# PARTS LIST

X77-1120-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| D-2 | C15 | CK45B1H103K | CK 0.01μF ±10% |
| C-3 | C16 | CK45B1H103K | CK 0.01μF ±10% |
| D-3 | C17 | CK45B1H103K | CK 0.01μF ±10% |
| B-2 | C18 | C91-0549-05 | Tantalum 1μF 35WV |
| D-3 | C19 | CE04W1C330M | CE 33μF 16WV |
| E-3 | C20 | CE04W1C330M | CE 33μF 16WV |
| F-3 | C21 | CK45B1H103K | CK 0.01μF ±10% |
| D-2 | C22 | CK45B1H103K | CK 0.01μF ±10% |
| C-2 | C23 | CK45B1H103K | CK 0.01μF ±10% |
| C-3 | C24 | CE04W1C100M | CE 10μF 16WV |
| E-2 | TC1 | C05-0412-05 | TC 20pF |
| E-3 | L1 | L40-2201-03 | Ferri-inductor 22μH |
| E-3 | L2 | L40-2201-03 | Ferri-inductor 22μH |
| C-3 | D1 | | Diode Zener WZ-081 |
| C-3 | Q1 | | TR NPN 2SC1215 (T or S) |
| C-2 | Q2 | | FET Dual DN1901 |
| C-2 | Q3 | | TR NPN 2SC1215 (T or S) |
| C-2 | Q4 | | TR NPN 2SC1215 (T or S) |
| D-2 | Q5 | | TR PNP 2SA1161 |
| D-2 | Q6 | | TR PNP 2SA1161 |
| D-3 | Q7 | | TR NPN 2SC2499 |
| E-2 | IC1 | | IC Linear CA3102E |
| D-3 | P43 | E40-0276-06 | Pin connector 2P |
| D-3 | P44 | E40-0276-05 | Pin connector 2P |
| F-3 | P45 | E40-0676-05 | Pin connector 6P |
| C-4 | P51 | E40-0576-05 | Pin connector 5P |
| | | J25-2979-014 | Printed circuit board |

POWER BLANKING UNIT X68-1310-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| C-6 | R1 | RN14BK2B5102F | RN 51kΩ ±1% 1/8W |
| C-6 | R2 | RN14BK2B5101F | RN 5.1kΩ ±1% 1/8W |
| B-5 | R3 | RD14BB2C102J | RD 1kΩ |
| B-5 | R4 | RD14BB2C562J | RD 5.6kΩ |
| B-5 | R5 | RD14BB2C101J | RD 100Ω |
| B-5 | R6 | RD14BB2C102J | RD 1kΩ |
| C-5 | R7 | RN14BK2B1303F | RN 130kΩ ±1% 1/8W |
| C-5 | R8 | RN14BK2B5601F | RN 5.6kΩ ±1% 1/8W |
| C-4 | R9 | RD14BB2C561J | RD 560Ω |
| C-4 | R10 | RD14BB2C392J | RD 3.9kΩ |
| C-4 | R11 | RN14BK2B5101F | RN 5.1kΩ ±1% 1/8W |
| C-4 | R12 | RN14BK2B5101F | RN 5.1kΩ ±1% 1/8W |
| C-4 | R13 | RD14BB2C561J | RD 560Ω |
| C-4 | R14 | RD14BB2C392J | RD 3.9kΩ |
| C-4 | R15 | RN14BK2B1301F | RN 1.3kΩ ±1% 1/8W |
| C-4 | R16 | RN14BK2B3901F | RN 3.9kΩ ±1% 1/8W |
| C-5 | R17 | RD14BB2C561J | RD 560Ω |
| C-5 | R18 | RD14BB2C222J | RD 2.2kΩ |
| B-6 | R19 | RD14BB2E100J | RD 10Ω ±5% 1/4W |
| B-6 | R20 | RN14BK2B1302F | RN 13kΩ ±1% 1/8W |
| B-6 | R21 | RN14BK2B8201F | RN 8.2kΩ ±1% 1/8W |
| D-5 | R22 | RD14BB2C472J | RD 4.7kΩ |
| D-5 | R23 | RD14BB2C223J | RD 22kΩ |
| D-5 | R24 | RD14BB2C223J | RD 22kΩ |
| D-5 | R25 | RD14BB2C103J | RD 10kΩ |
| D-6 | R26 | RD14BB2C682J | RD 6.8kΩ |
| D-5 | R27 | RD14BB2C332J | RD 3.3kΩ |
| D-6 | R28 | RD14BB2C332J | RD 3.3kΩ |
| E-6 | R29 | RD14BB2C510J | RD 51Ω |
| E-6 | R30 | RD14BB2C510J | RD 51Ω |
| E-6 | R31 | RD14BB2C471J | RD 470Ω |
| E-6 | R32 | RD14BB2C222J | RD 2.2kΩ |
| E-5 | R33 | RD14BB2C222J | RD 2.2kΩ |
| E-5 | R34 | RD14BB2C471J | RD 470Ω |
| F-6 | R35 | RD14BB2C332J | RD 3.3kΩ |
| F-6 | R36 | RD14BB2C102J | RD 1kΩ |
| F-6 | R37 | RD14BB2C102J | RD 1kΩ |
| E-5 | R38 | RD14BB2C332J | RD 3.3kΩ |
| E-5 | R39 | RD14BB2C122J | RD 1.2kΩ |
| E-5 | R40 | RD14BB2E101J | RD 100Ω ±5% 1/4W |
| E-4 | R41 | RD14BB2C221J | RD 220Ω |
| E-4 | R42 | RD14BB2C222J | RD 2.2kΩ |
| D-4 | R43 | RD14BB2C432J | RD 4.3kΩ |
| D-4 | R44 | RD14BB2C471J | RD 470Ω |
| E-4 | R45 | RD14BB2C753J | RD 75kΩ |
| D-4 | R46 | RD14BB2C124J | RD 120kΩ |
| D-4 | R47 | RD14BB2C562J | RD 5.6kΩ |
| D-4 | R48 | RD14BB2C561J | RD 560Ω |
| E-3 | R49 | RD14BB2C470J | RD 47Ω |
| E-4 | R50 | RD14BB2C104J | RD 100kΩ |
| E-5 | R51 | RD14BB2C221J | RD 220Ω |
| E-5 | R52 | RD14BB2C562J | RD 5.6kΩ |
| E-4 | R53 | RD14BB2C124J | RD 120kΩ |
| E-4 | R54 | RD14BB2C124J | RD 120kΩ |
| E-3 | R55 | RD14BB2C470J | RD 47Ω |
| E-4 | R56 | RD14BB2C332J | RD 3.3kΩ |
| E-3 | R57 | RD14BB2C561J | RD 560Ω |
| C-3 | R58 | RD14BB2C683J | RD 68kΩ |
| C-3 | R59 | RD14BB2C683J | RD 68kΩ |
| C-3 | R60 | RD14BB2C102J | RD 1kΩ |
| C-3 | R61 | RD14BB2C102J | RD 1kΩ |
| C-3 | R62 | RD14BB2C103J | RD 10kΩ |
| C-4 | R63 | RD14BB2C102J | RD 1kΩ |
| C-2 | R64 | RD14BB2C683J | RD 68kΩ |
| B-2 | R65 | RD14BB2C103J | RD 10kΩ |

# PARTS LIST

X68-1310-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| B-2 | R66 | RD14BB2C103J | RD | 10kΩ | | |
| C-2 | R67 | RD14BB2C102J | RD | 1kΩ | | |
| B-2 | R68 | RD14BB2C472J | RD | 4.7kΩ | | |
| B-1 | R69 | RD14BB2C330J | RD | 33Ω | | |
| D-3 | R70 | R92-0793-05 | MG | 15MΩ | ±5% | 1/2W |
| F-2 | R71 | RC05GF2H335J | RC | 3.3MΩ | ±5% | 1/2W |
| F-2 | R72 | RC05GF2H156J | RC | 15MΩ | ±5% | 1/2W |
| E-2 | R73 | R92-0755-05 | MG | 3MΩ | ±5% | 1/2W |
| E-2 | R74 | R92-0756-05 | MG | 47MΩ | ±5% | 1/2W |
| A-4 | R75 | RD14BB2C562J | RD | 5.6kΩ | | |
| A-3 | R76 | RD14BB2C124J | RD | 120kΩ | | |
| A-3 | R77 | RD14BB2C103J | RD | 10kΩ | | |
| B-3 | R78 | RD14BB2E101J | RD | 100Ω | ±5% | 1/4W |
| B-3 | R79 | RD14BB2E221J | RD | 220Ω | ±5% | 1/4W |
| F-5 | R80 | RD14BB2C221J | RD | 220Ω | | |
| C-3 | R81 | RD14BB2C102J | RD | 1kΩ | | |
| | R82 | RD14BB2C102J | RD | 1kΩ | | |
| | R83 | RN14BK2B2200F | RN | 220Ω | ±1% | 1/8W |
| | R84 | RN14BK2B5101F | RN | 5.1kΩ | ±1% | 1/8W |
| F-5 | VR1 | R03-3502-05 | VR | 10kΩ | | |
| C-3 | VR2 | R12-3041-05 | VR | 10kΩ | | |
| C-3 | VR3 | R12-3041-05 | VR | 10kΩ | | |
| G-3 | VR4 | R23-1501-05 | VR | 1kΩ | | |
| D-5 | VR5 | R12-1028-05 | VR | 4.7kΩ | | |
| E-6 | VR6 | R12-3041-05 | VR | 10kΩ | | |
| C-2 | VR7 | R12-3042-05 | VR | 47kΩ | | |
| G-2 | VR8 | R05-8001-05 | VR | 3MΩ | | |
| A-4 | VR9 | R12-5501-05 | VR | 150kΩ | | |
| A-3 | VR10 | R12-5501-05 | VR | 150kΩ | | |
| C-6 | C1 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-5 | C2 | CE04W1V100M | CE | 10μF | | 35WV |
| C-6 | C3 | CE04W1J330M | CE | 33μF | | 63WV |
| B-5 | C4 | CE04W2C3R3M | CE | 3.3μF | | 160WV |
| C-5 | C5 | CE04W2C3R3M | CE | 3.3μF | | 160WV |
| C-4 | C6 | CE04W1C330M | CE | 33μF | | 16WV |
| C-4 | C7 | C91-0549-05 | Tantalum | 1μF | | 35WV |
| C-4 | C8 | CE04W1E101M | CE | 100μF | | 25WV |
| C-4 | C9 | CE04W1E101M | CE | 100μF | | 25WV |
| C-5 | C10 | CE04W1A221M | CE | 220μF | | 10WV |
| B-6 | C11 | CE04W1V100M | CE | 10μF | | 35WV |
| B-6 | C12 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-5 | C13 | CE04W1V470M | CE | 47μF | | 35WV |
| B-3 | C14 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-3 | C15 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-3 | C16 | CK45B1H103K | CK | 0.01μF | ±10% | |
| E-6 | C17 | CC45CH1H680J | CC | 68pF | ±5% | |
| F-6 | C18 | CC45CH1H680J | CC | 68pF | ±5% | |
| E-5 | C19 | CK45B1H472K | CK | 4700pF | ±10% | |
| E-5 | C20 | CK45B1H472K | CK | 4700pF | ±10% | |
| F-5 | C21 | C91-0549-05 | Tantalum | 1μF | | 35WV |
| F-5 | C22 | C91-0549-05 | Tantalum | 1μF | | 35WV |
| E-4 | C23 | CC45CH1H220J | CC | 22pF | ±5% | |
| E-4 | C24 | CC45CH2H010C | CC | 1pF | ±0.25pF | 500WV |
| D-4 | C25 | CK45B2H472K | CK | 4700pF | ±10% | 500WV |
| D-4 | C26 | CK45B1H103K | CK | 0.01μF | ±10% | |
| E-4 | C27 | CC45CH2H010C | CC | 1pF | ±0.25pF | 500WV |
| E-3 | C28 | CK45B2H472K | CK | 4700pF | ±10% | 500WV |
| E-3 | C29 | CK45B1H103K | CK | 0.01μF | ±10% | |
| D-4 | C30 | CE04W2C3R3M | CE | 3.3μF | | 160WV |
| D-3 | C31 | CK45B2H472K | CK | 4700pF | ±10% | 500WV |
| D-5 | C32 | CE04W1A221M | CE | 220μF | | 10WV |
| D-5 | C33 | CK45B1H103K | CK | 0.01μF | ±10% | |
| D-4 | C34 | CE04W1E101M | CE | 100μF | | 25WV |
| D-4 | C35 | CK45B1H103K | CK | 0.01μF | ±10% | |

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description | | | |
|---|---|---|---|---|---|---|
| D-3 | C36 | CK45E3D103P | CK | 0.01μF | +100%,-0% | 2kWV |
| D-3 | C37 | CK45E3D103P | CK | 0.01μF | +100%,-0% | 2kWV |
| E-3 | C38 | CK45E3D103P | CK | 0.01μF | +100%,-0% | 2kWV |
| E-3 | C39 | CK45E3D103P | CK | 0.01μF | +100%,-0% | 2kWV |
| D-2 | C40 | CK45B3D102K | CK | 1000pF | ±10% | 2kWV |
| C-2 | C41 | CQ93M1H154K | CQ | 0.15μF | ±10% | |
| C-2 | C42 | CK45B1H103K | CK | 0.01μF | ±10% | |
| C-2 | C43 | CK45B1H472K | CK | 4700pF | ±10% | |
| C-2 | C44 | CE04W1E470M | CE | 47μF | | 25WV |
| B-2 | C45 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-2 | C46 | CE04W1E470M | CE | 47μF | | 25WV |
| B-2 | C47 | CK45B1H103K | CK | 0.01μF | ±10% | |
| B-1 | C48 | CE04W1E470M | CE | 47μF | | 25WV |
| B-2 | C49 | CQ93M1H472K | CQ | 4700pF | ±10% | |
| C-3 | C50 | CE04W1E470M | CE | 47μF | | 25WV |
| C-3 | C51 | CK45B1H472K | CK | 4700pF | ±10% | |
| D-1 | C52 | CK45E3D103P | CK | 0.01μF | +100%,-0% | 2kWV |
| F-2 | C53 | CK45E3D103P | CK | 0.01μF | +100%,-0% | 2kWV |
| F-1 | C54 | CK45B3D102K | CK | 1000pF | ±10% | 2kWV |
| B-3 | C55 | CK45B2H222K | CK | 2200pF | ±10% | 500WV |
| B-3 | C56 | CK45B2H222K | CK | 2200pF | ±10% | 500WV |
| E-6 | C57 | CC45CH1H101J | CC | 100pF | ±5% | |
| E-5 | C58 | CC45CH1H101J | CC | 100pF | ±5% | |
| A-3 | C59 | CK45B2H222K | CK | 2200pF | ±10% | 500WV |
| D-6 | TC1 | C05-0405-05 | TC | 20pF | | |
| E-4 | TC2 | C05-0405-05 | TC | 20pF | | |
| E-4 | TC3 | C05-0403-05 | TC | 6pF | | |
| C-6 | L1 | L40-1011-04 | Ferri-inductor | 100μH | | |
| C-4 | L2 | L40-1001-01 | Ferri-inductor | 10μH | | |
| C-6 | L3 | L40-1011-04 | Ferri-inductor | 100μH | | |
| D-5 | L4 | L40-1011-04 | Ferri-inductor | 100μH | | |
| D-4 | L5 | L40-1011-04 | Ferri-inductor | 100μH | | |
| D-4 | L6 | L40-1011-04 | Ferri-inductor | 100μH | | |
| B-2 | L7 | L40-1011-04 | Ferri-inductor | 100μH | | |
| B-2 | L8 | L40-1011-04 | Ferri-inductor | 100μH | | |
| B-2 | L9 | L40-1011-04 | Ferri-inductor | 100μH | | |
| B-5 | D1 | | Diode | Silicon | DS442X | |
| B-4 | D2 | | Diode | Zener | WZ-120 | |
| B-4 | D3 | | Diode | Zener | WZ-120 | |
| E-5 | D4 | | Diode | Zener | WZ-032 | |
| E-5 | D5 | | Diode | Silicon | DS442X | |
| D-5 | D6 | | Diode | Silicon | DS442X | |
| E-5 | D7 | | Diode | Zener | WZ-090 | |
| D-3 | D8 | | Diode | Silicon | 1SS83 | |
| E-3 | D9 | | Diode | Silicon | 1SS83 | |
| D-2 | D10 | | Diode | Silicon | W06C | |
| D-2 | D11 | | Diode | Silicon | W06C | |
| F-2 | D12 | | Diode | Silicon | W06C | |
| F-1 | D13 | | Diode | Silicon | W06C | |
| C-2 | D14 | | Diode | Silicon | DS442X | |
| C-2 | D15 | | Diode | Silicon | DS442X | |
| C-2 | D16 | | Diode | Zener | WZ-032 | |
| B-2 | D17 | | Diode | Silicon | DS442X | |
| C-2 | D18 | | Diode | Zener | WZ-061 | |
| B-5 | Q1 | | TR | NPN | 2SC1913 (Q or R) | |
| B-5 | Q2 | | TR | NPN | 2SC1505 (L) | |

# PARTS LIST

X68-1310-00

| Fig. & Index No. | Ref. No. | Parts No. | Name & Description |
|---|---|---|---|
| C-4 | Q3 | | TR PNP 2SB633 (E) |
| C-4 | Q4 | | TR NPN 2SD613 (E) |
| C-5 | Q5 | | TR PNP 2SB633 (E) |
| B-6 | Q6 | | TR NPN 2SC1505 (L) |
| B-6 | Q7 | | TR NPN 2SC536KNP (F) |
| B-4 | Q8 | | TR NPN 2SC1505 (L) |
| B-3 | Q9 | | TR NPN 2SC536KNP (F) |
| B-3 | Q10 | | TR PNP 2SA608KNP (F) |
| B-3 | Q11 | | TR NPN 2SC536KNP (F) |
| B-3 | Q12 | | TR PNP 2SA608KNP (F) |
| E-5 | Q13 | | TR NPN 2SC1215 (T or S) |
| E-5 | Q14 | | TR NPN 2SC1215 (T or S) |
| E-5 | Q15 | | TR NPN 2SC1215 (T or S) |
| D-5 | Q16 | | TR NPN 2SC536KNP (F) |
| D-5 | Q17 | | TR NPN 2SC1047 (C) |
| D-4 | Q18 | | TR PNP 2SA838 (C) |
| E-3 | Q19 | | TR NPN 2SC805A-2(2,3) |
| D-4 | Q20 | | TR PNP 2SA923-2 (2, 3) |
| | Q21 | | TR NPN 2SC2910 S or T |
| | Q22 | | TR PNP 2SA1208 S or T |
| C-3 | Q23 | | TR NPN 2SC2910 S or T |
| C-3 | Q24 | | TR NPN 2SC2910 S or T |
| B-2 | Q25 | | TR NPN 2SC536KNP (F) |
| C-2 | Q26 | | TR NPN 2SC536KNP (F) |
| B-2 | Q27 | | TR PNP 2SA608KNP (F) |
| C-2 | Q28 | | FET N-channel 2SK19 (BL) |
| B-1 | Q29 | | TR NPN 2SD613 (E) |
| B-4 | IC1 | | IC Linear NJM4558D |
| B-5 | IC2 | | IC Linear NJM4558D |
| D-6 | P22 | E40-0776-05 | Pin connector 7P |
| F-5 | P23a | E40-0476-05 | Pin connector 4P |
| F-3 | P23b | E40-0476-05 | Pin connector 4P |
| B-3 | P24 | E40-0276-05 | Pin connector 2P |
| C-3 | P25 | E40-0276-05 | Pin connector 2P |
| F-6 | P26a | E40-0576-05 | Pin connector 5P |
| F-3 | P26b | E40-0576-05 | Pin connector 5P |
| D-5 | P27 | E40-0876-05 | Pin connector 8P |
| E-6 | P28 | E40-0476-05 | Pin connector 4P |
| A-2 | P29 | E40-0703-05 | Pin connector 7P |
| A-5 | P30 | E40-0746-05 | Pin connector 7P |
| A-3 | P32 | E40-0476-05 | Pin connector 4P |
| E-1 | P33 | E40-0332-05 | Pin connector 3P |
| E-6 | P34 | E40-0276-05 | Pin connector 2P |
| | | E31-0762-05 | Lead wire with connector |
| | | F01-0826-05 | Heat sink |
| | | F02-0414-04 | Heat sink |
| | | F20-0516-05 | Sheet (Insulator) |
| | | F20-0623-05 | Sheet (insulator) |
| F-3 | PL1 | B30-0927-05 | Pilot lamp |
| F-3 | PL2 | B30-0927-05 | Pilot lamp |
| F-3 | PL3 | B30-0927-05 | Pilot lamp |
| F-3 | PL4 | B30-0927-05 | Pilot lamp |
| D-2 | NL1 | | Neon lamp NE-2B |
| D-2 | NL2 | | Neon lamp NE-2B |
| E-2 | NL3 | | Neon lamp NE-2B |
| E-2 | NL4 | | Neon lamp NE-2B |
| | | J30-0605-05 | Spacer (For TR) |
| | | J25-2972-03 | Printed circuit board |

# VOLTAGES AND WAVEFORMS

The voltages and waveforms are measured on each schematic diagram as follows;

### TEST EQUIPEMENT

| | | |
|---|---|---|
| Digital multimeter | : | DL-720 (TRIO) |
| Oscilloscope | : | 475A (TEKTRONIX) |
| Sine wave generator | : | SG-502 (TEKTRONIX) |

### CONTROL SETTINGS

| | |
|---|---|
| A INTENSITY | Midrange |
| FOCUS | Midrange |
| AC-GND-DC | GND for voltage measurement<br>DC for waveform measurement |
| ▲▼POSITION | Midrange |
| X GAIN | OFF |
| VOLTS/DIV | 0.2V |
| V. VARIABLE | CAL |
| CH 2 INV | OFF |
| V. MODE | Unless otherwise specified CH 1 |
| 20 MHz BW | OFF |
| PUSH 50Ω | OFF |
| COUPLING | AC |
| SLOPE | + |
| TRIG. MODE | AUTO |
| HOLDOFF | NORM |
| A SWEEP TIME/DIV | 0.2ms |
| B SWEEP TIME/DIV | 50μs |
| A. VARIABLE | CAL |
| ◄► POSITION | Midrange |
| H. DISPLAY | A |
| ×10 MAG | OFF |

**NOTE:**
In differencial circuit, the voltages and waveforms are shown only CH 1 and CH 3.

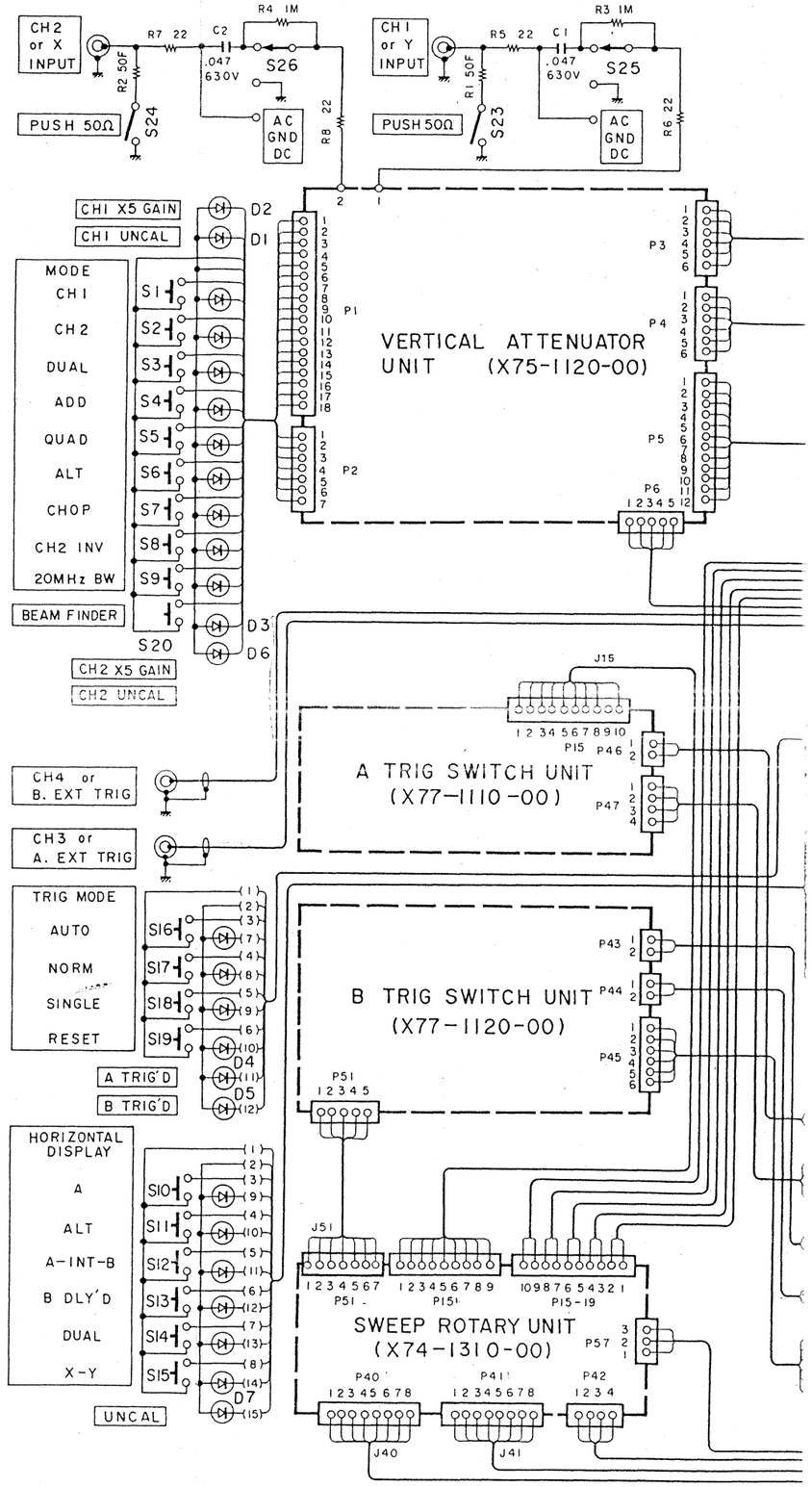
### Voltage Measurements

Voltage measurements are taken with no signal applied and the trace positioned to the center horizontal graticule line. The digital multimeter common should be connected to chassis ground at the nearest measurement point.

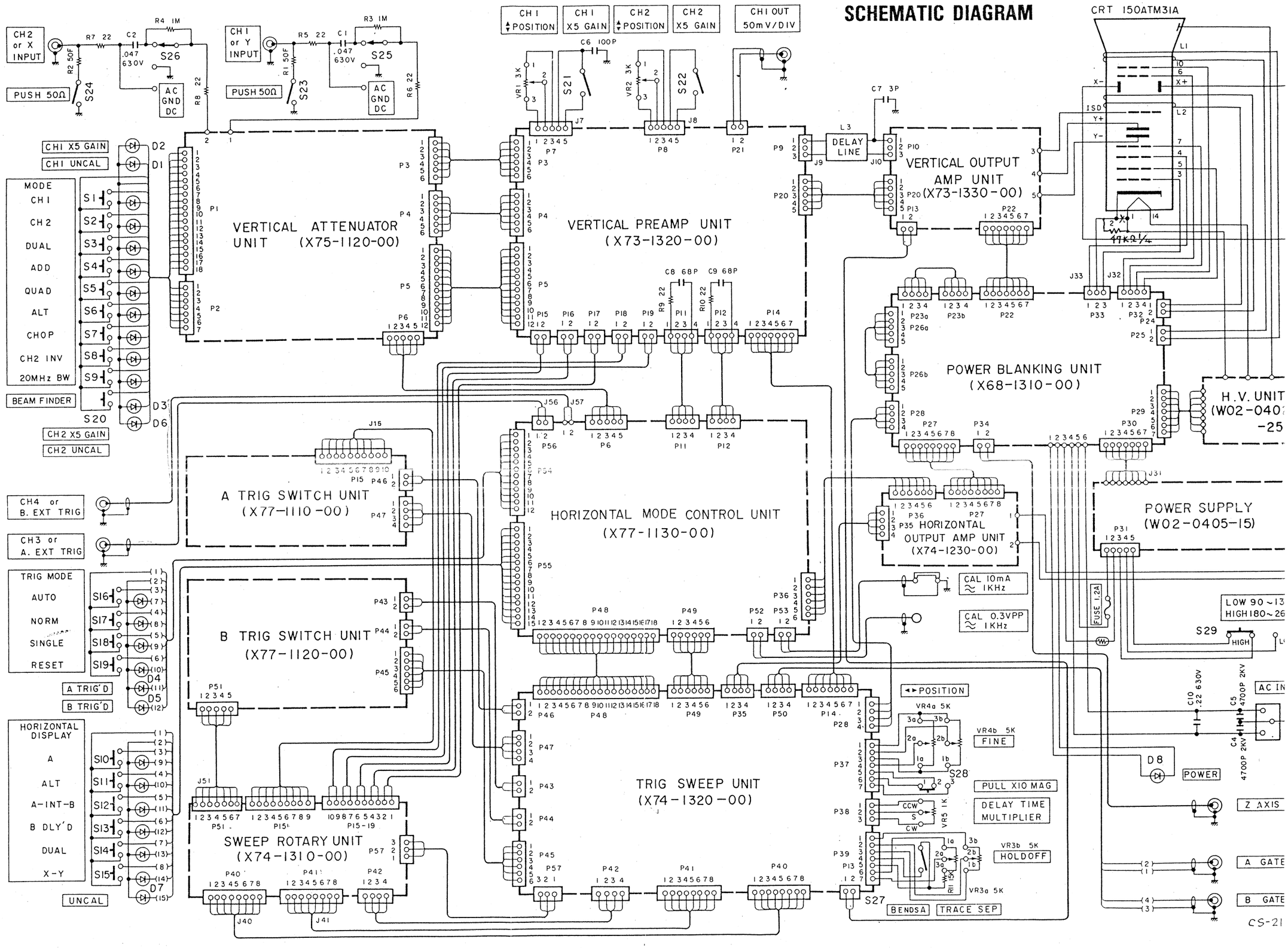
### Waveform Condition

Waveforms are measured with 1 kHz 1Vp-p sine wave applied CH 1 input and 1 kHz 500m Vp-p applied CH3 input.



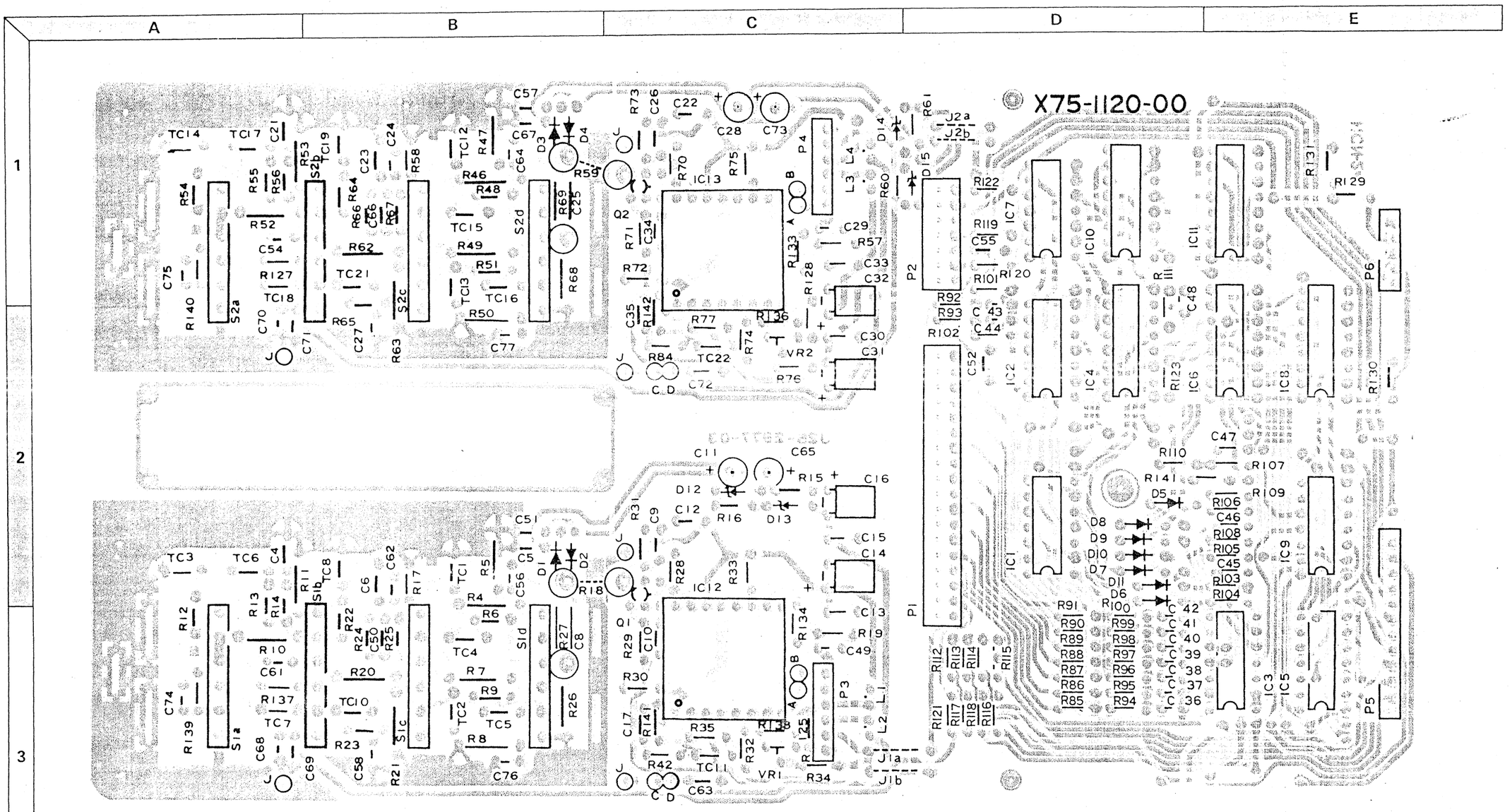


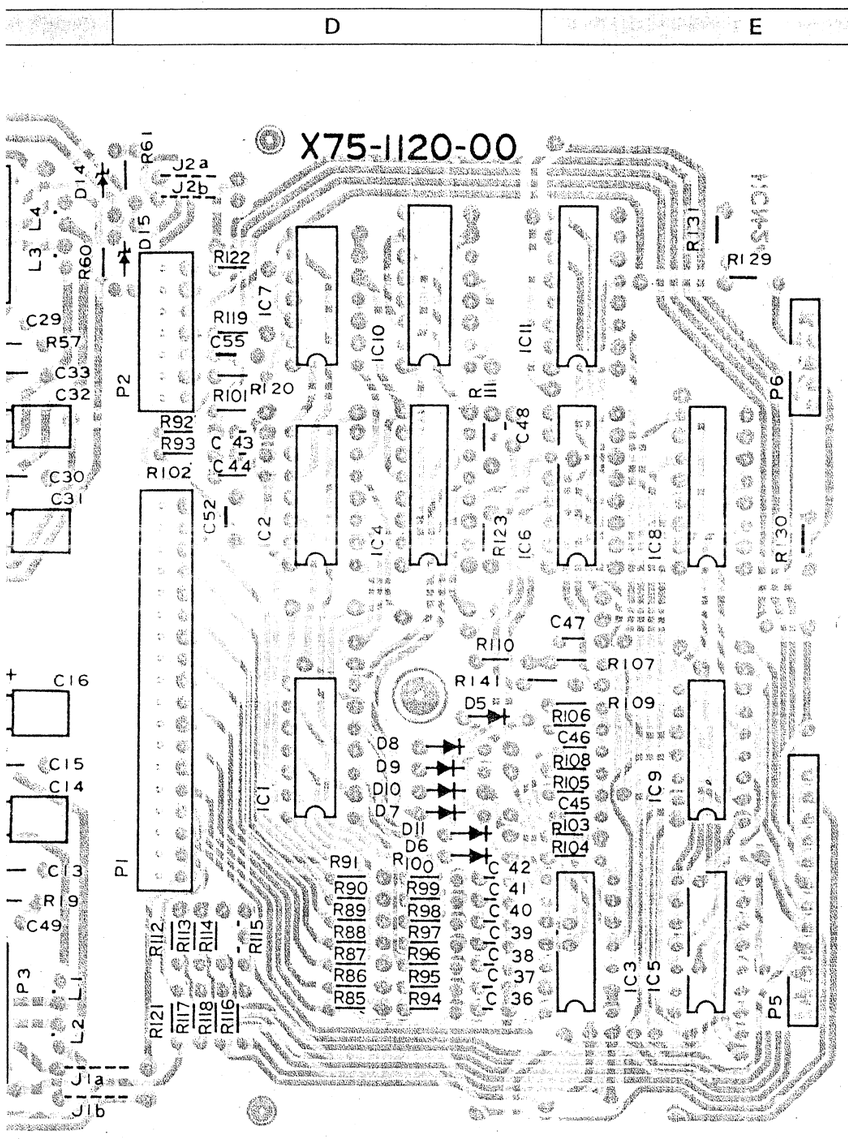
# SCHEMATIC DIAGRAM

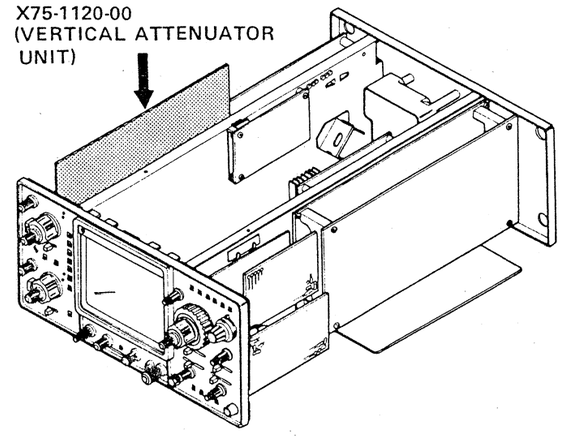


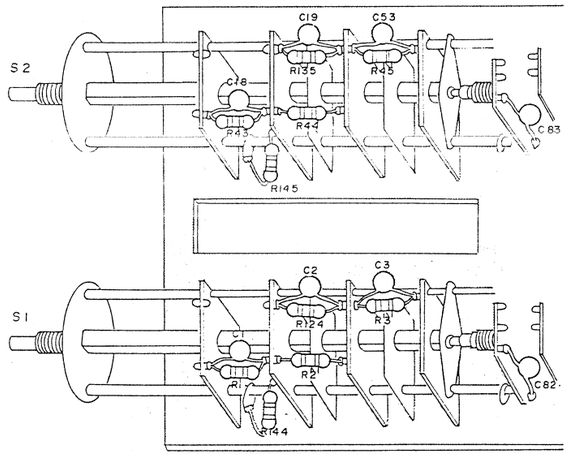
# PC BOARD

5-1120-00





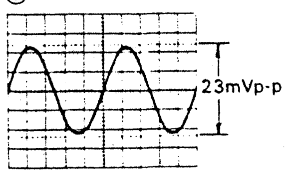



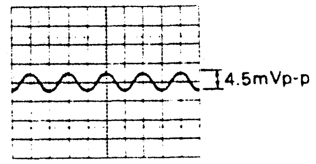

Location of Parts in the Rotary Switch

# WAVEFORMS

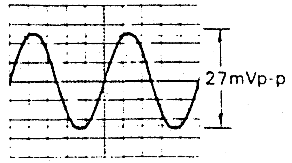
①



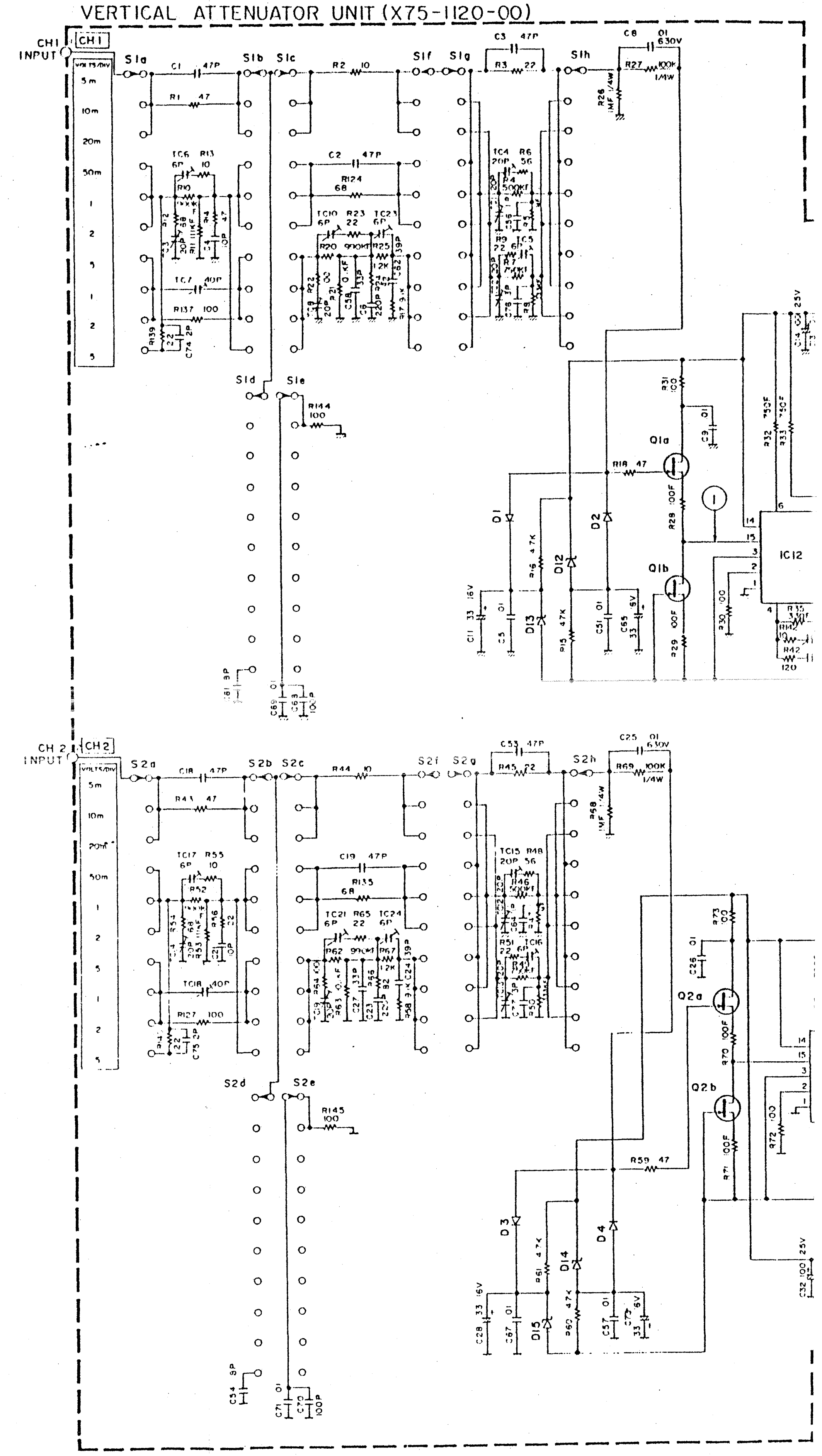

② ④




③ ⑤



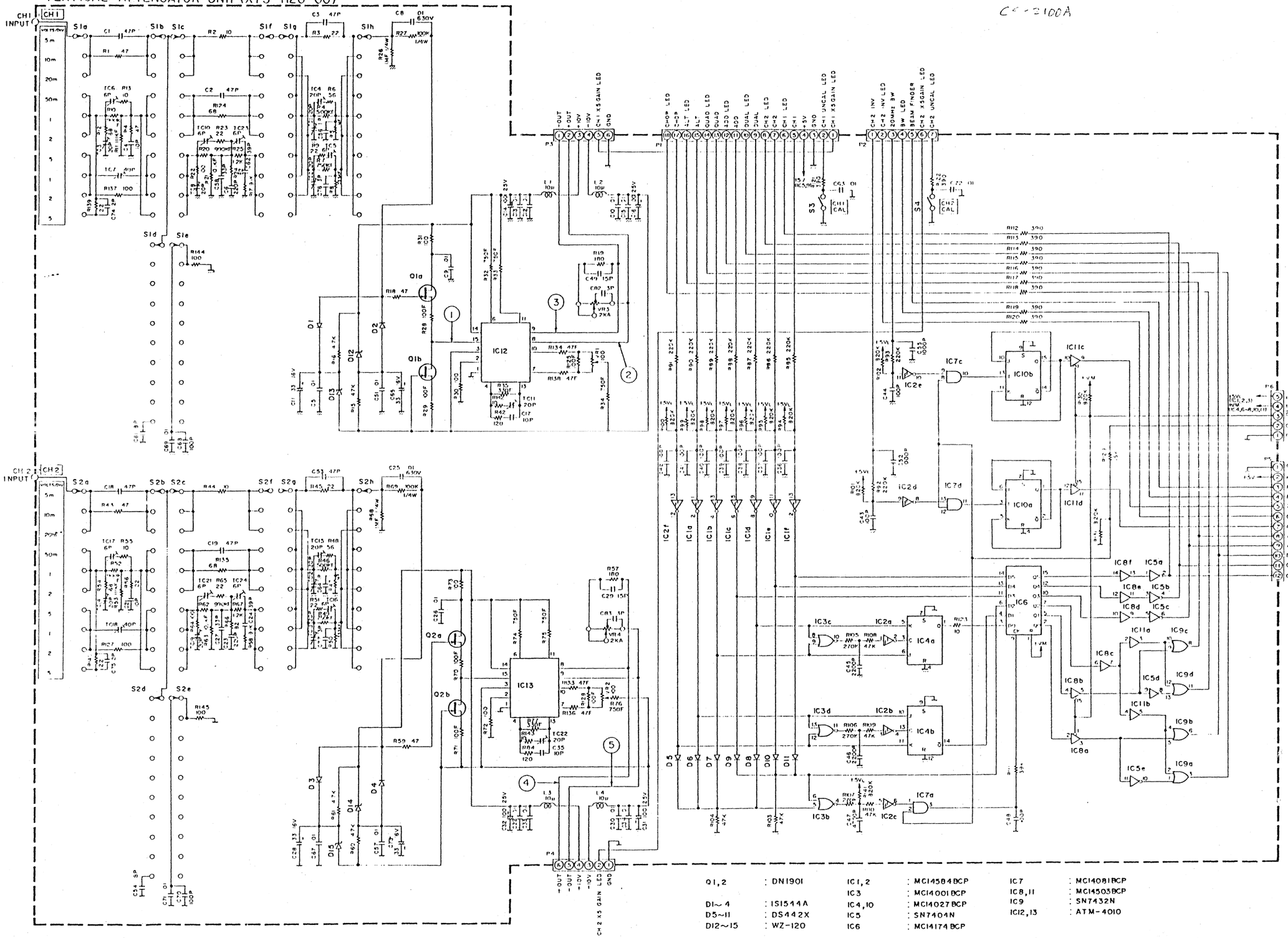

VERTICAL ATTENUATOR UNIT (X75-1120-00)



# SCHEMATIC DIAGRAM

C4-2100A

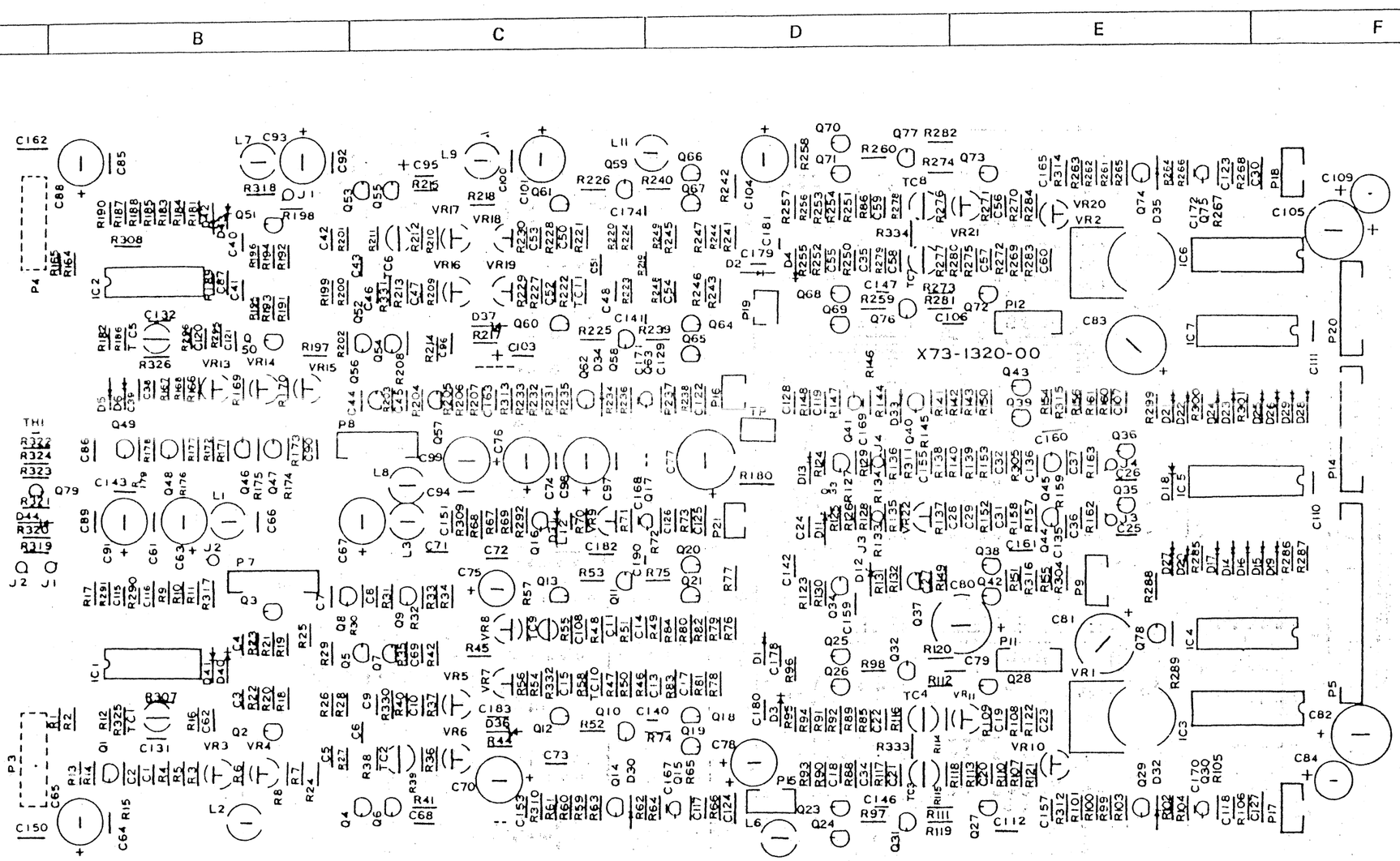
## VERTICAL ATTENUATOR UNIT (X75-1120-00)



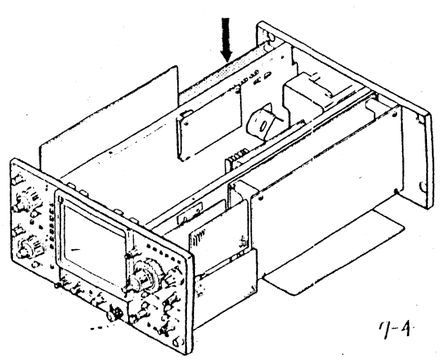

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Q1,2 | : DN1901 | IC1,2 | : MC14584BCP | IC7 | : MC14081BCP |
| | | IC3 | : MC14001BCP | IC8,11 | : MC14503BCP |
| D1~4 | : 1S1544A | IC4,10 | : MC14027BCP | IC9 | : SN7432N |
| D5~11 | : DS442X | IC5 | : SN7404N | IC12,13 | : ATM-4010 |
| D12~15 | : WZ-120 | IC6 | : MC14174BCP | | |

# PC BOARD

X73-1320-00

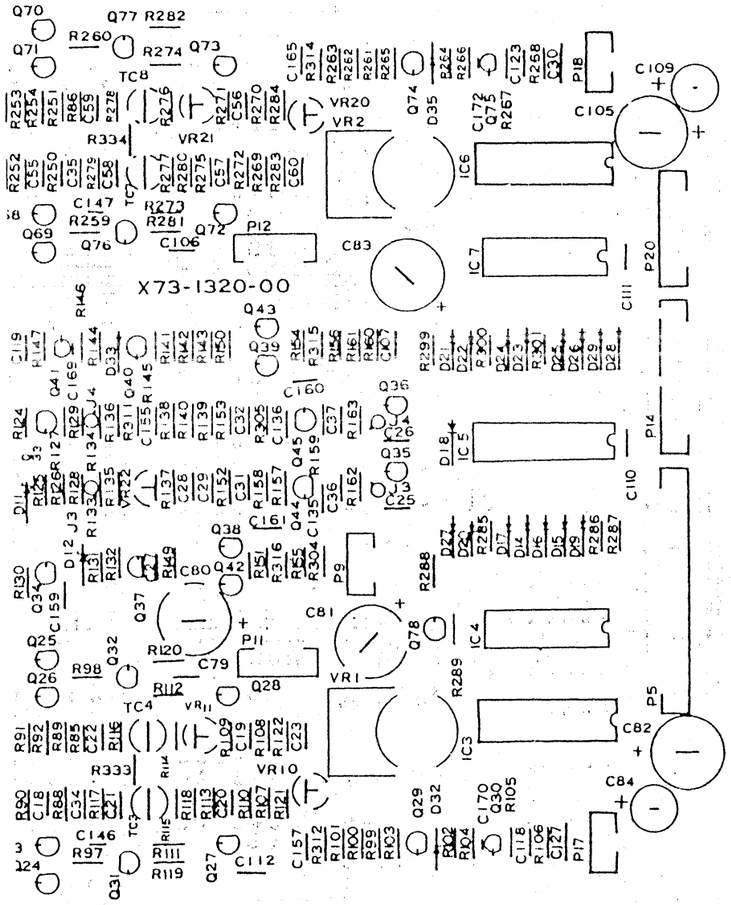



X73-1320-00
(V. PRE AMP UNIT)

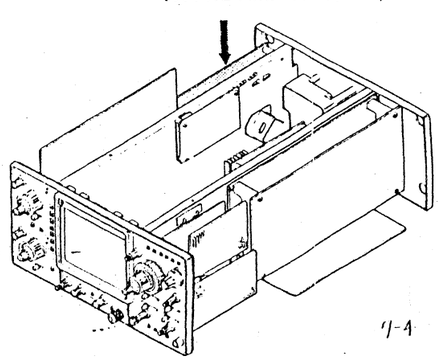


7-4

| | E | F |
|---|---|---|

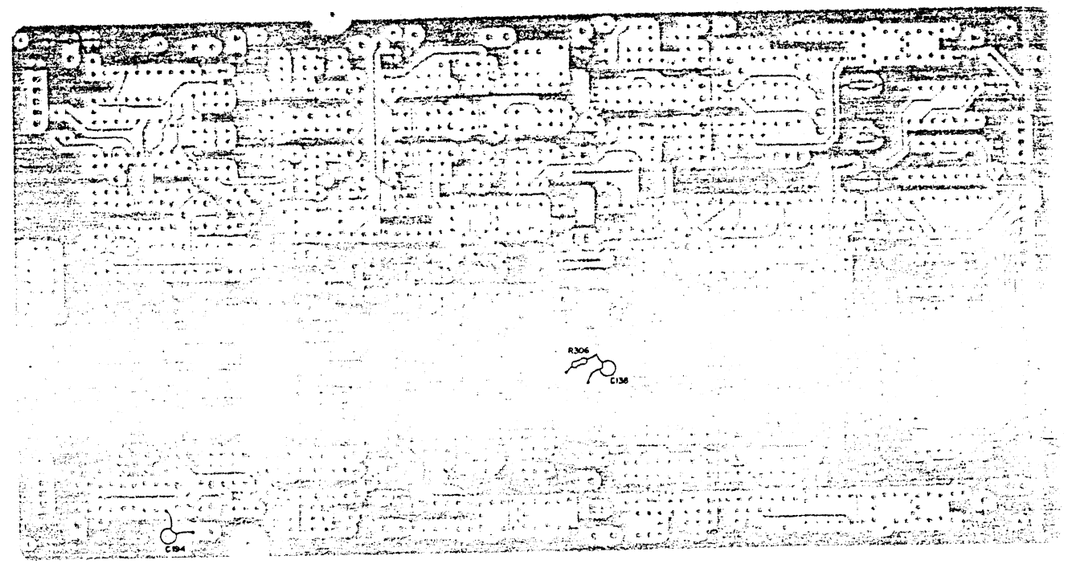



X73-1320-00
(V. PRE AMP UNIT)

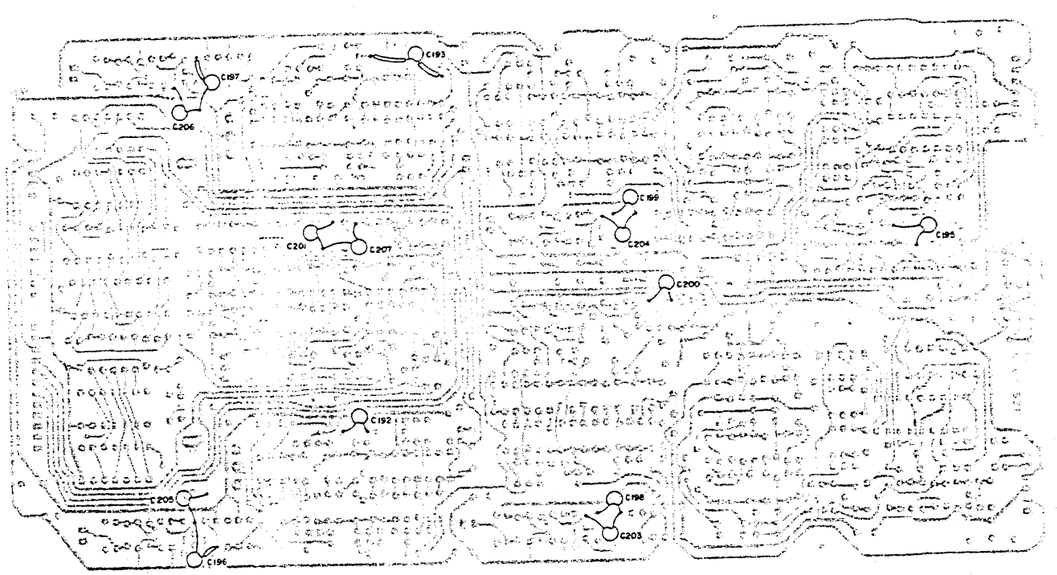


7-4

X73-1320-00



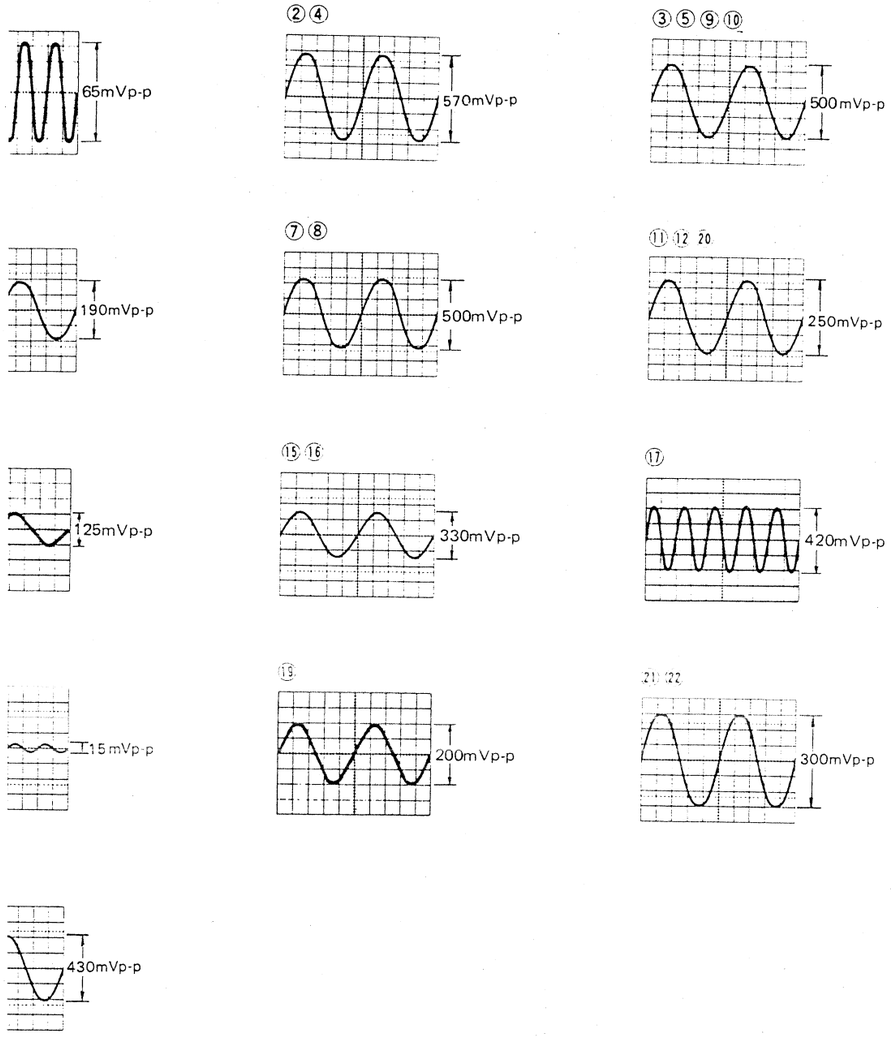

(Parts Side View)



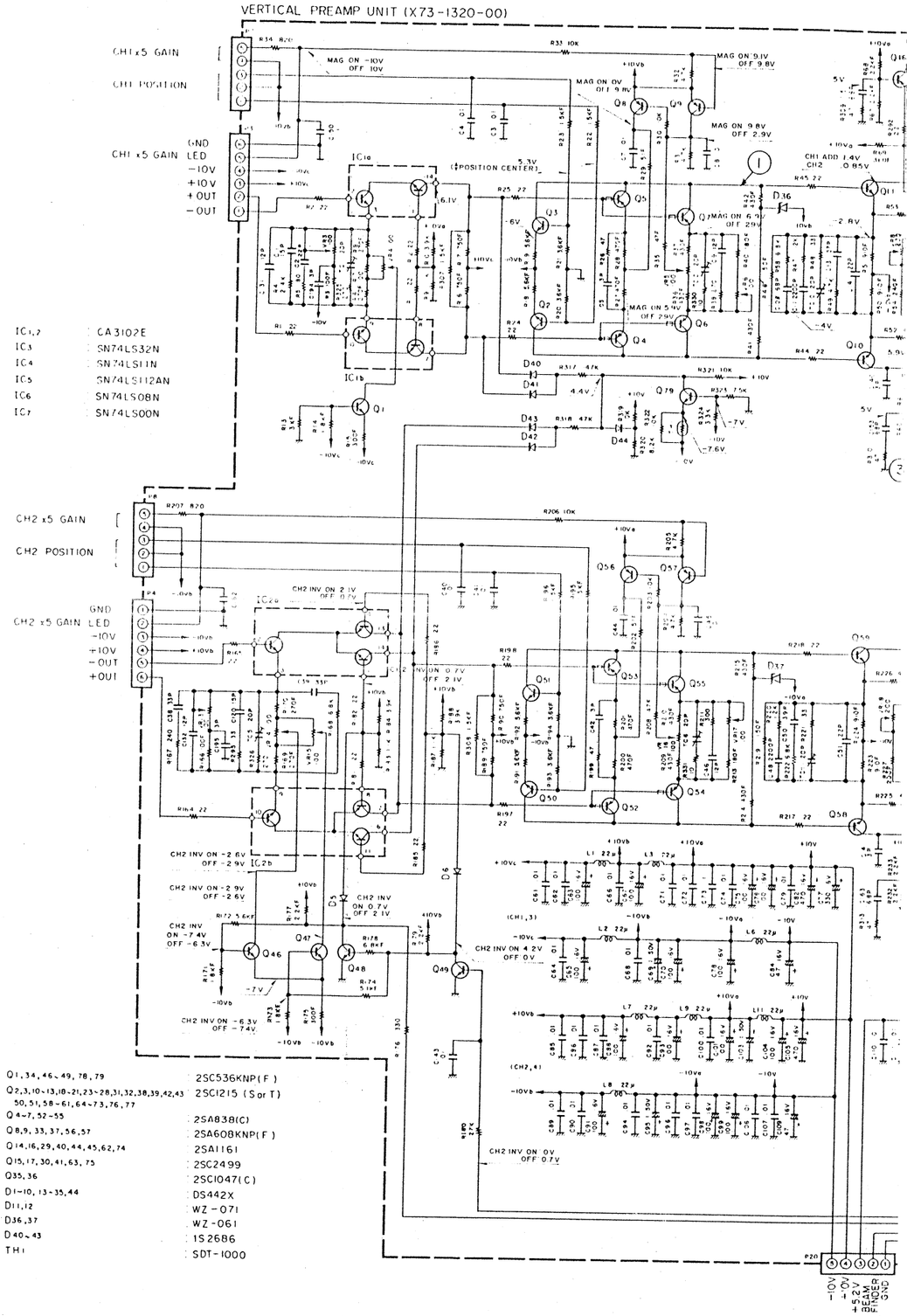

(Foil Side View)

7-4

# WAVEFORMS




# SCHEMATI



# SCHEMATIC DIAGRAM

CS-2100A

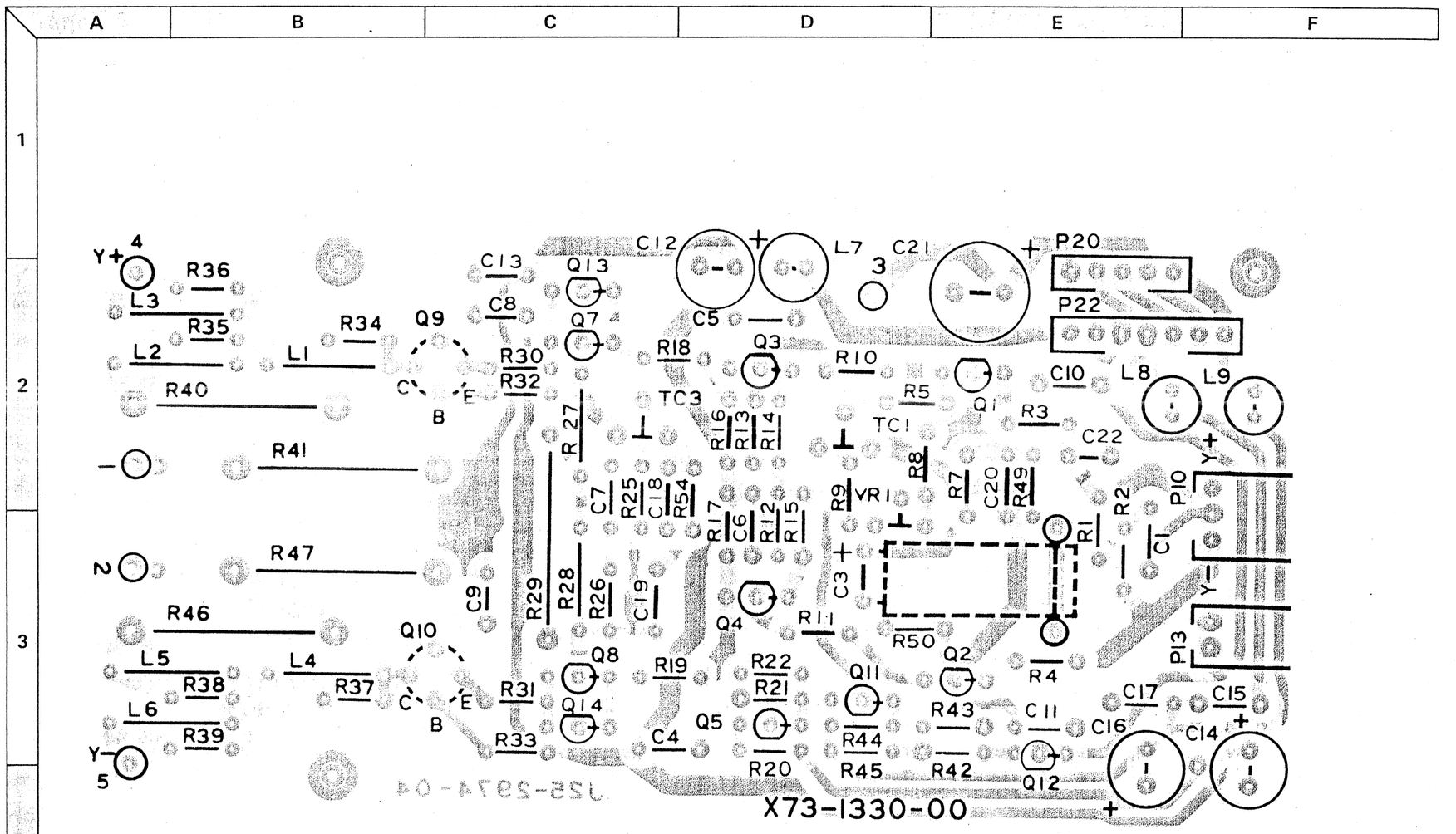
VERTICAL PREAMP UNIT (X73-1320-00)

| | |
|---|---|
| IC1,2 | CA3102E |
| IC3 | SN74LS32N |
| IC4 | SN74LS11N |
| IC5 | SN74LS112AN |
| IC6 | SN74LS08N |
| IC7 | SN74LS00N |

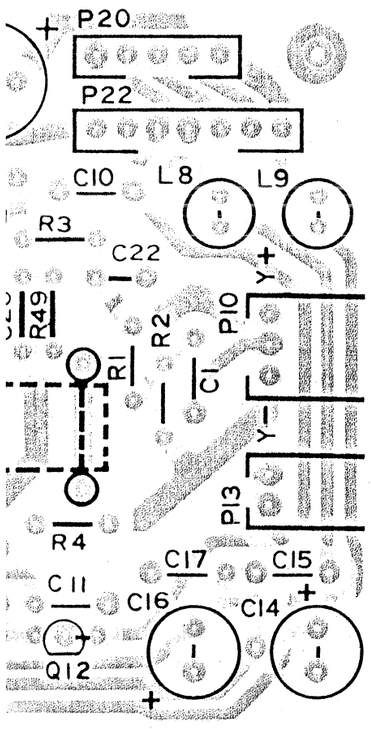
| | |
|---|---|
| Q1,34,46~49,78,79 | 2SC536KNP(F) |
| Q2,3,10~13,18~21,23~28,31,32,38,39,42,43 50,51,58~61,64~73,76,77 | 2SC1215 (S or T) |
| Q4~7,52~55 | 2SA838(C) |
| Q8,9,33,37,56,57 | 2SA608KNP(F) |
| Q14,16,29,40,44,45,62,74 | 2SA1161 |
| Q15,17,30,41,63,75 | 2SC2499 |
| Q35,36 | 2SC1047(C) |
| D1~10,13~35,44 | DS442X |
| D11,12 | WZ-071 |
| D36,37 | WZ-061 |
| D40~43 | 1S2686 |
| TH1 | SDT-1000 |

# PC BOARD

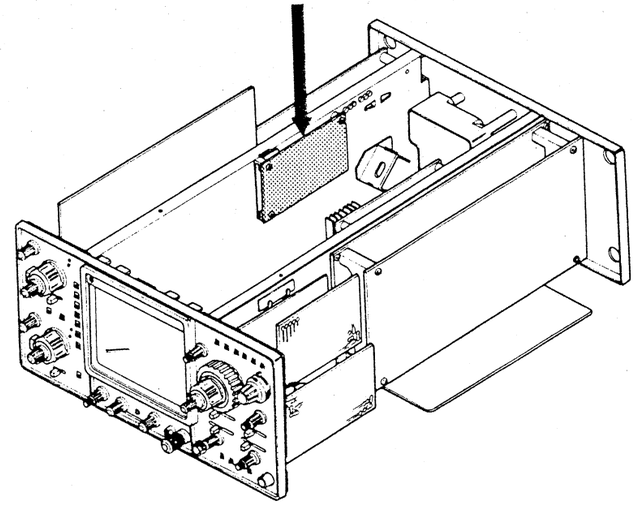
K73-1330-00



| E | F |
|---|---|

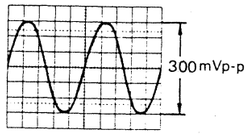



X73-1330-00
(V. OUTPUT UNIT)

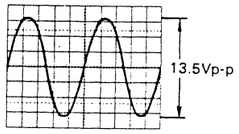


# WAVEFORMS

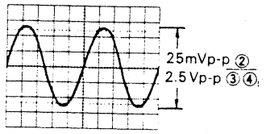
①



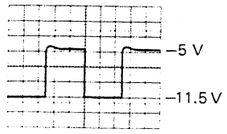

⑤⑥




②③④

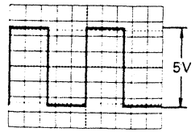



⑦ (at only ▲▼ TRACE SEP position)




▲▼ TRACE. SEP MAX

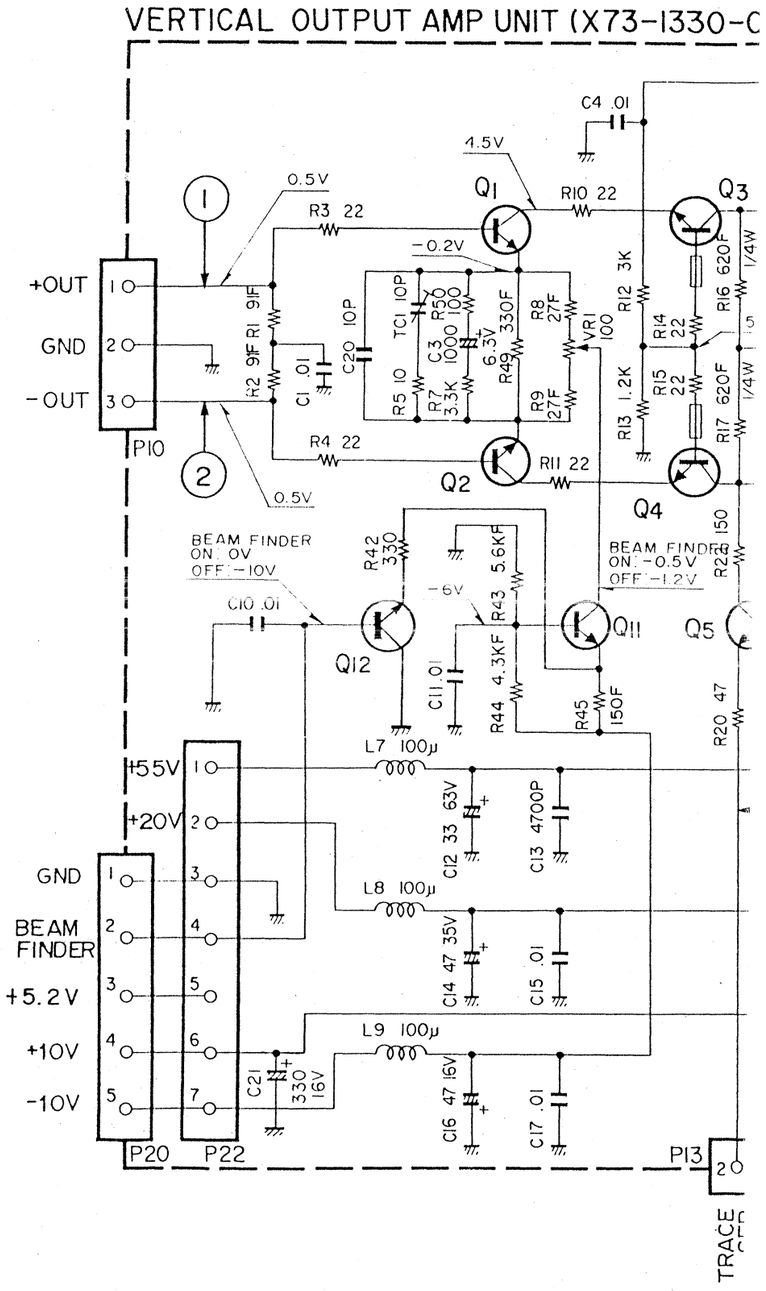
④ (at only ▲▼ TRACE SEP position)




▲▼ TRACE. SEP MAX
(AC-GND -DC: GND)

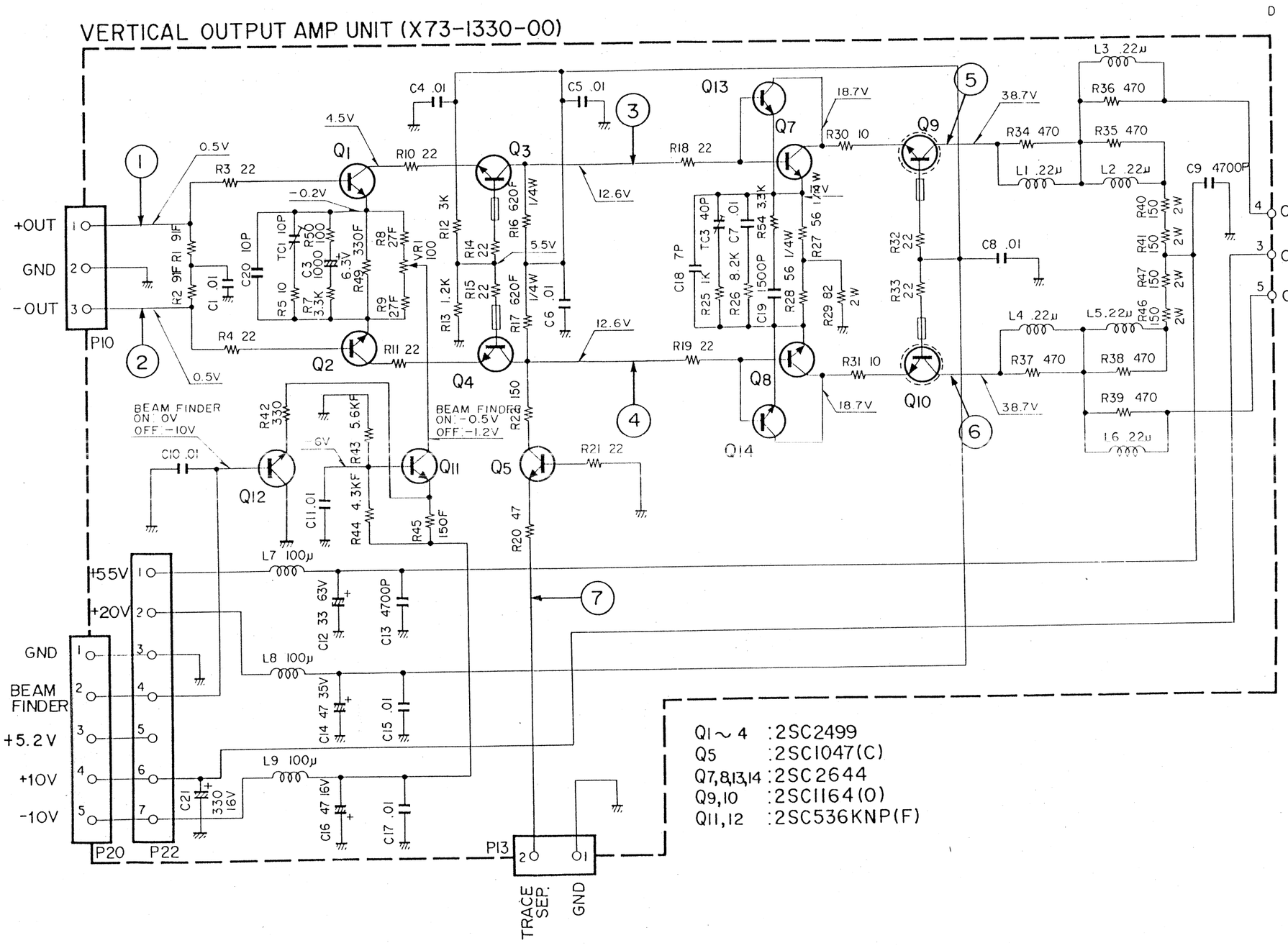


VERTICAL OUTPUT AMP UNIT (X73-1330-C



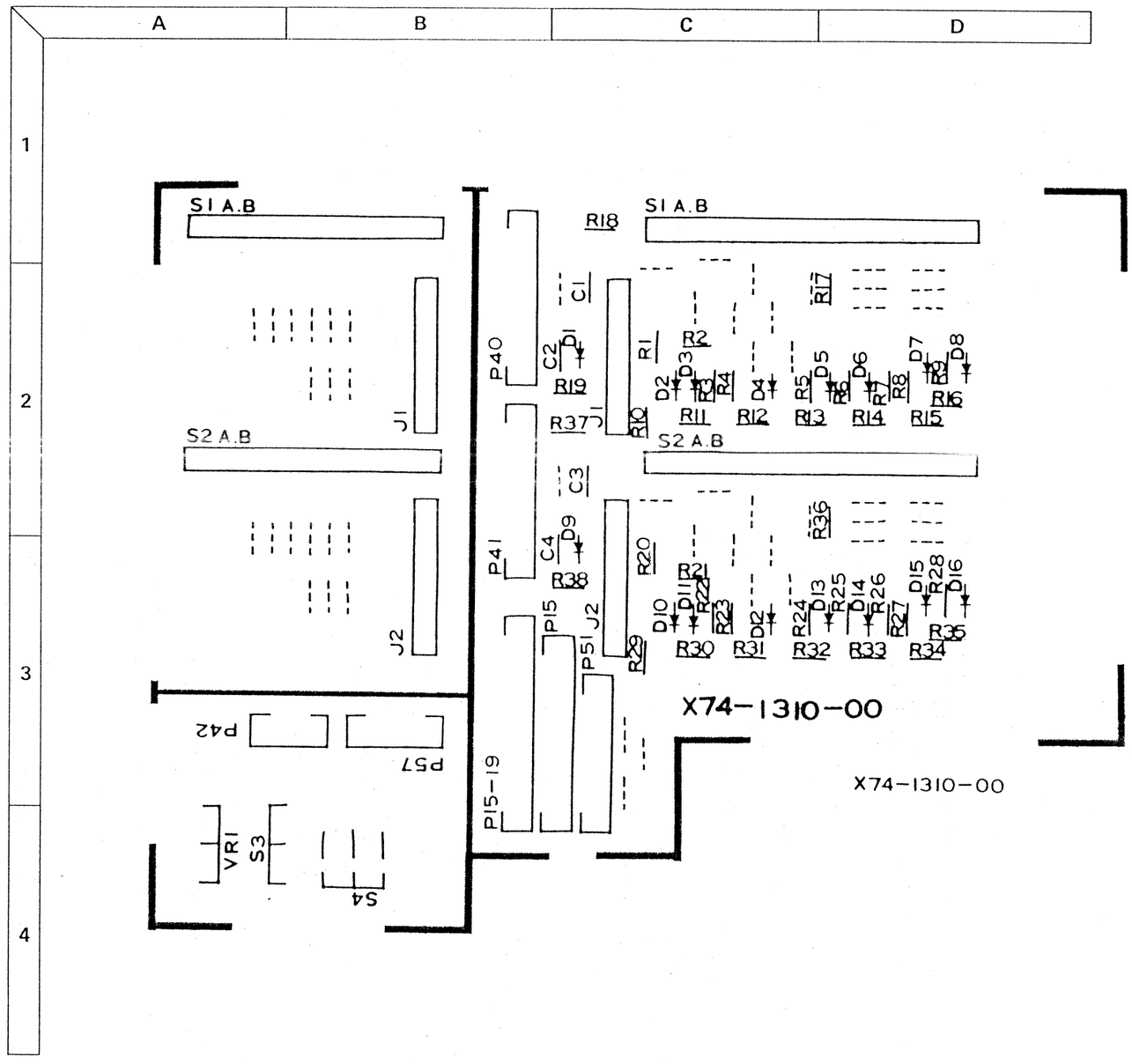
# SCHEMATIC DIAGRAM

CS-2160A

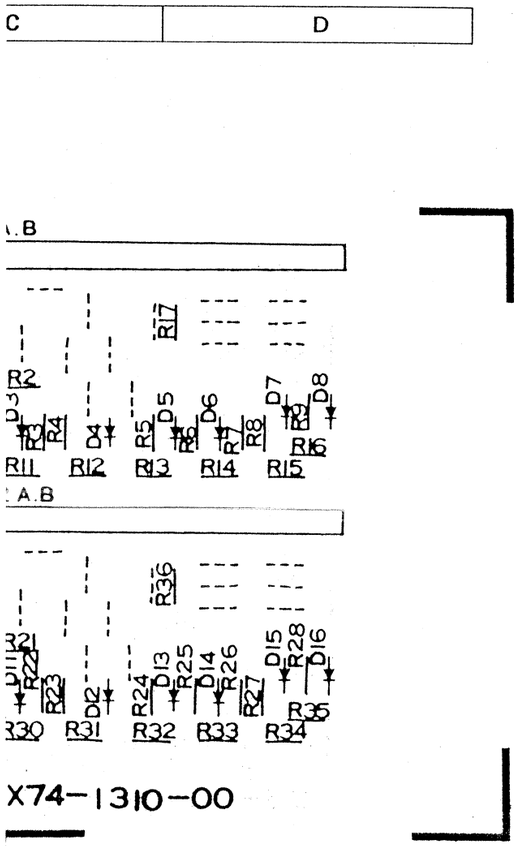


# PC BOARD

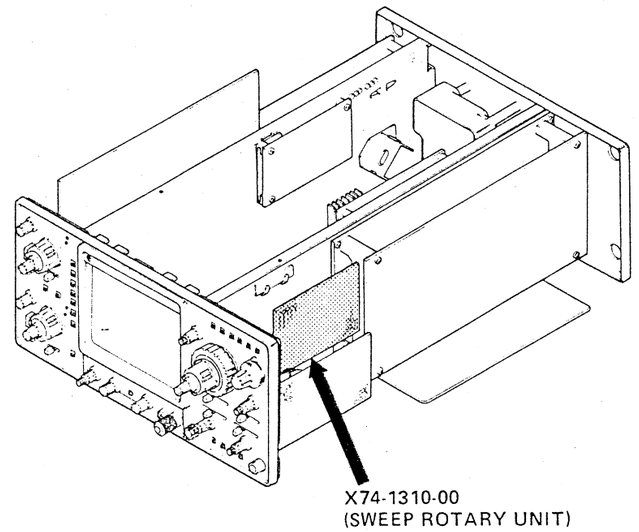
-1310-00




**CAUTION**
Because the silk symbols in P42 and P57 are reversed, please refer to the Schematic Diagram.

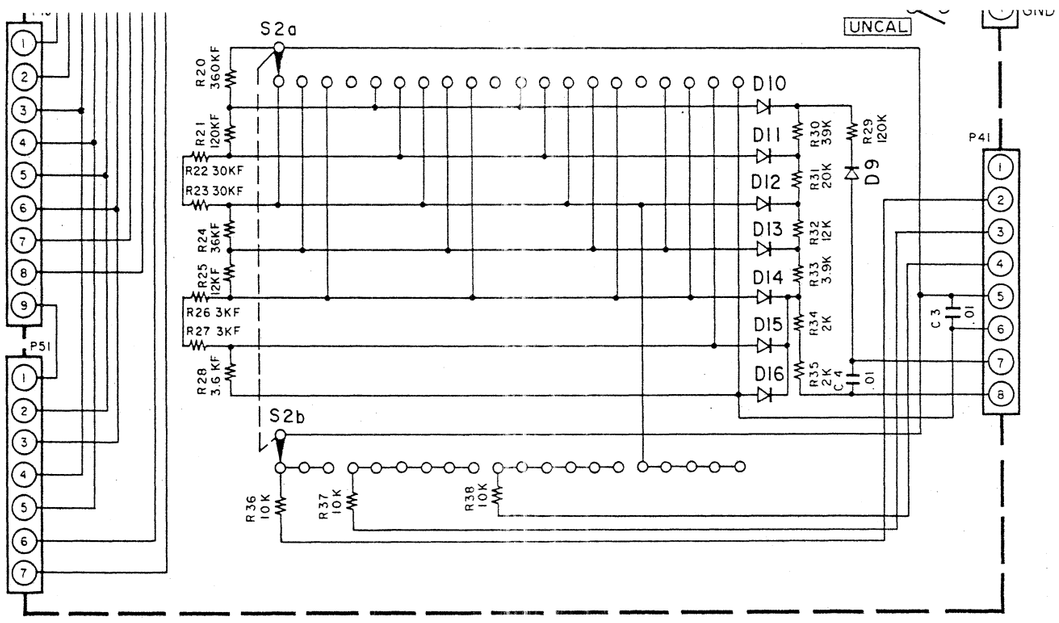



X74-1310-00



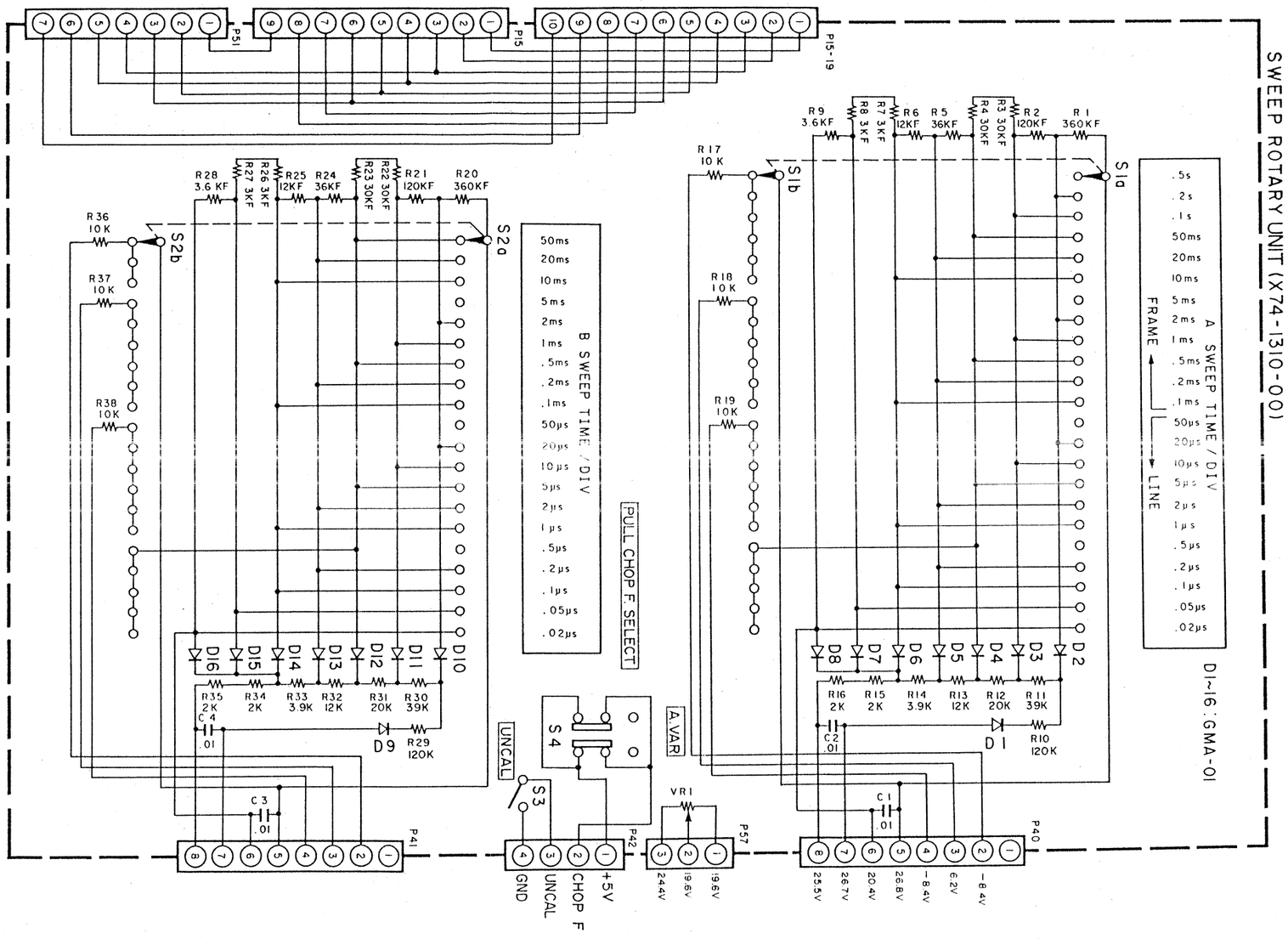
X74-1310-00
(SWEEP ROTARY UNIT)

**CAUTION**
Because the silk symbols in P42 and P57 are reversed, please refer to the Schematic Diagram.


UNCAL
GND
S2a
S2b
P51
P41
R20 360KF
R21 120KF
R22 30KF
R23 30KF
R24 36KF
R25 12KF
R26 3KF
R27 3KF
R28 3.6 KF
D10
D11
D12
D13
D14
D15
D16
D9
R30 39K
R29 120K
R31 20K
R32 12K
R33 3.9K
R34 2K
R35 2K
C3 .01
C4 .01
R36 10K
R37 10K
R38 10K

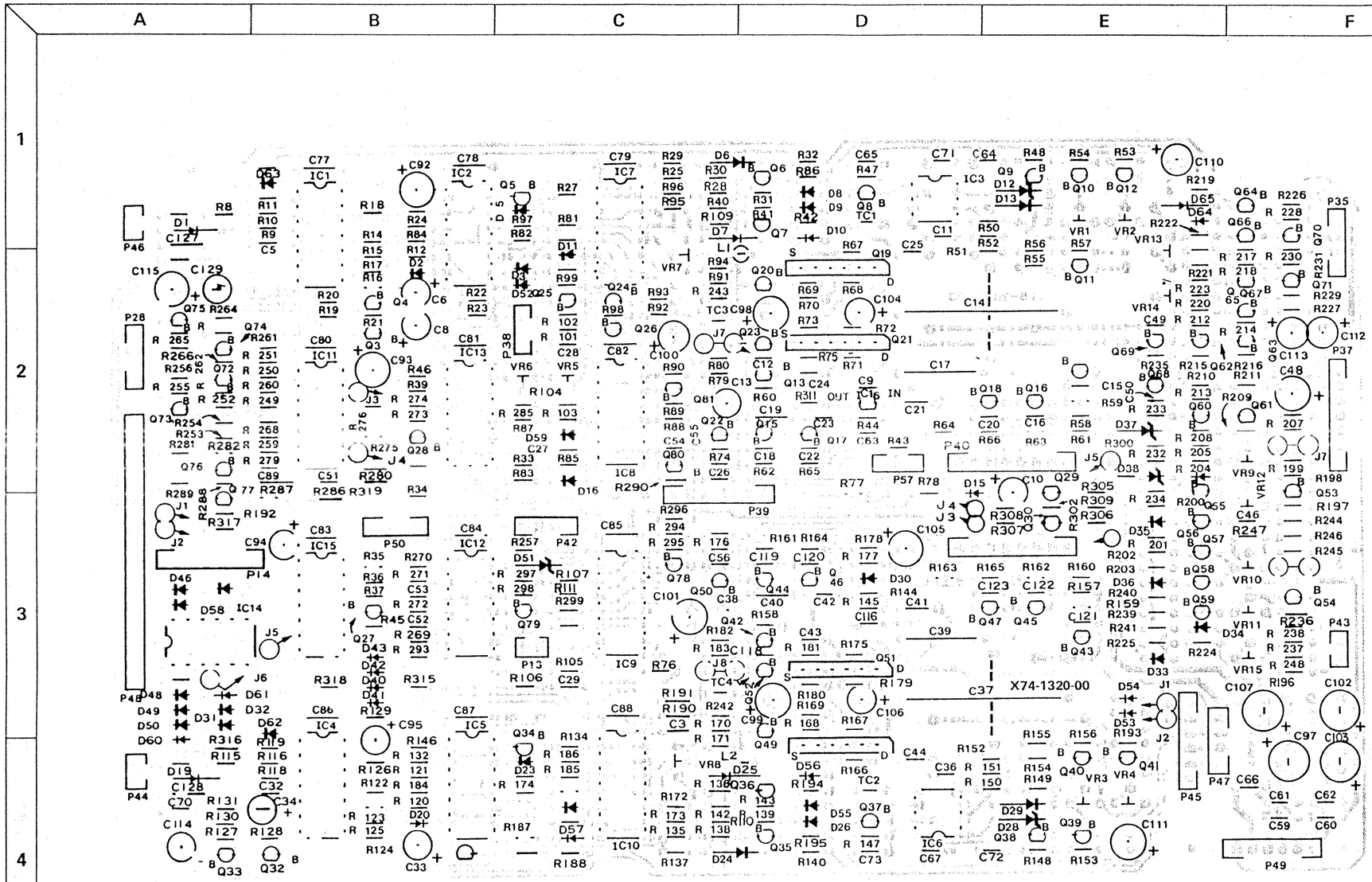
# SCHEMATIC DIAGRAM

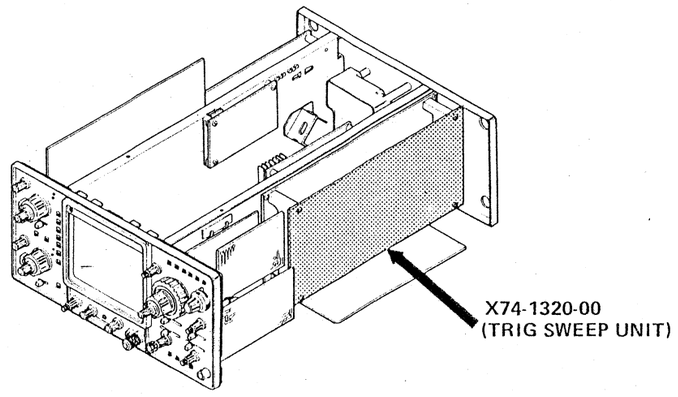
(CS-21001)



# PC BOARD

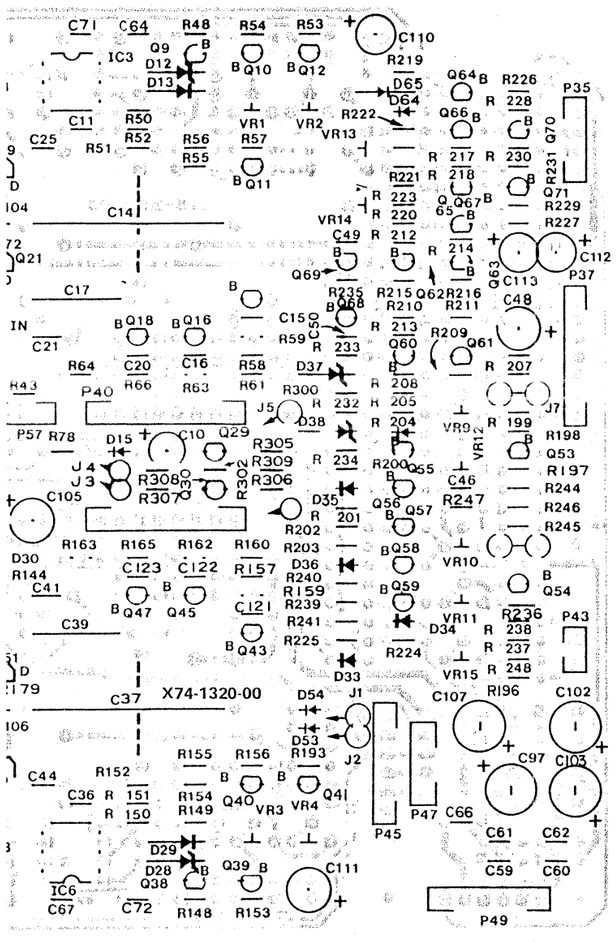
X74-1320-00

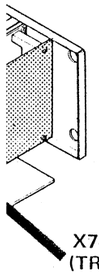


)

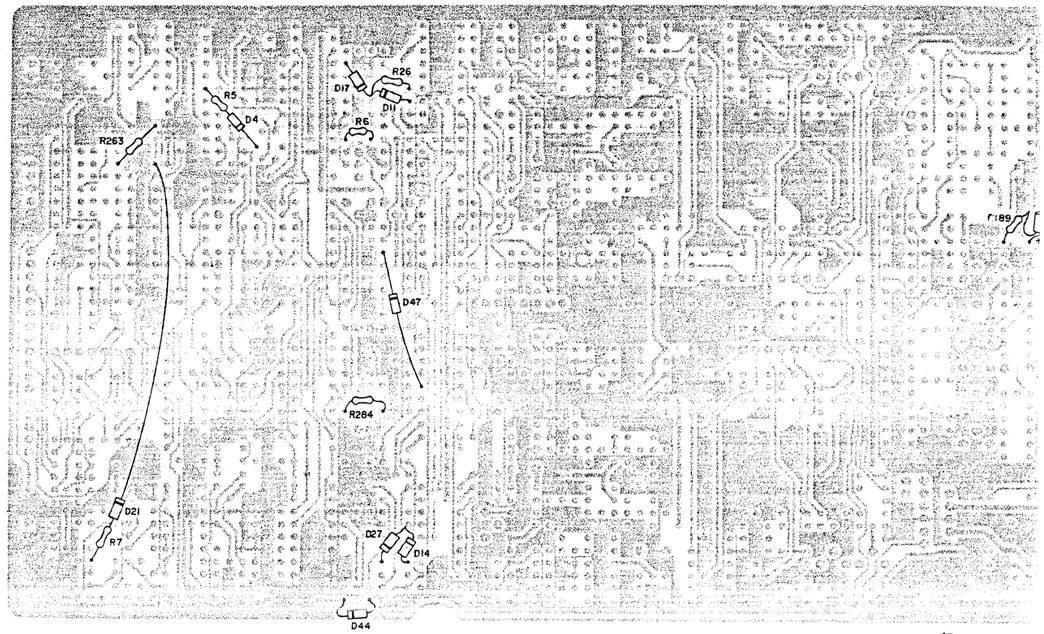
| | E | F |
|---|---|---|



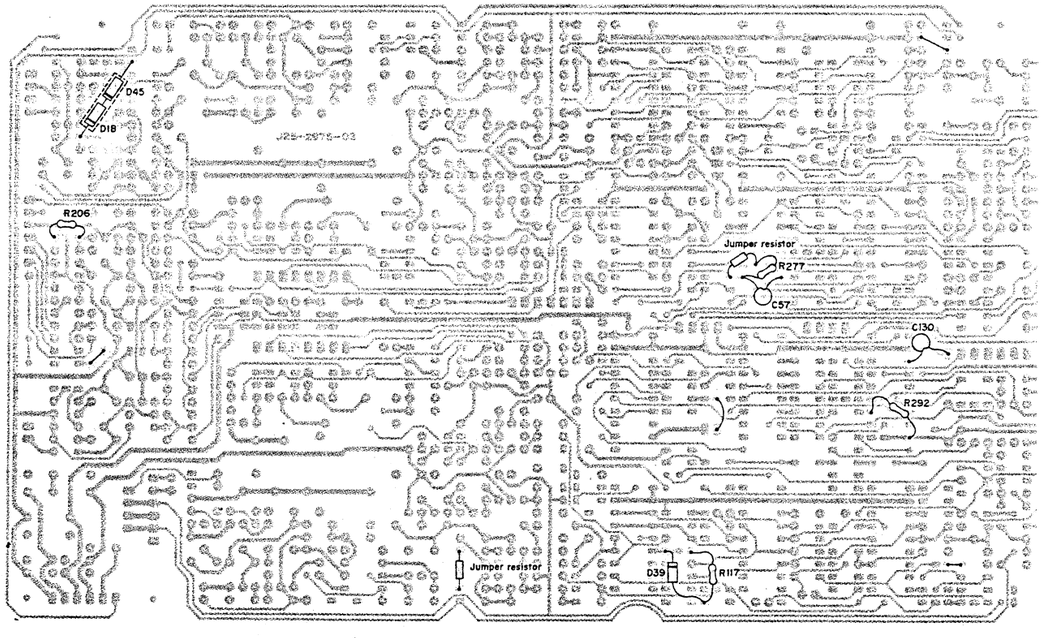



X74-1320-00
(TRIG SWEEP UNIT)

## X74-1320-00




(Parts Side




(Foil Side

# WAVEFORMS

① 0.9Vp-p

② 4.1V / 3.3V
Input signal 1kHz

③ 4.2V / 3.3V

④ 2.5V / 1.7V / 0.2V

⑤ 3.6V / 1.4V

⑥ 4.1V / 2.6V

⑦ 4.2V / 3.2V

⑧ 4.2V / 3.3V

⑨ 4.2V / 3.2V

⑩ 4.7V / 3.2V

⑪-1 1Vp-p
(H. DISPLAY: X-Y)

⑪-2 0.5V / −1.3V

⑫-1 0.9Vp-p
(H. DISPLAY: X-Y)

⑫-2 0.4V / −1.4V

⑬-1 0.9Vp-p
(H. DISPLAY: X-Y)

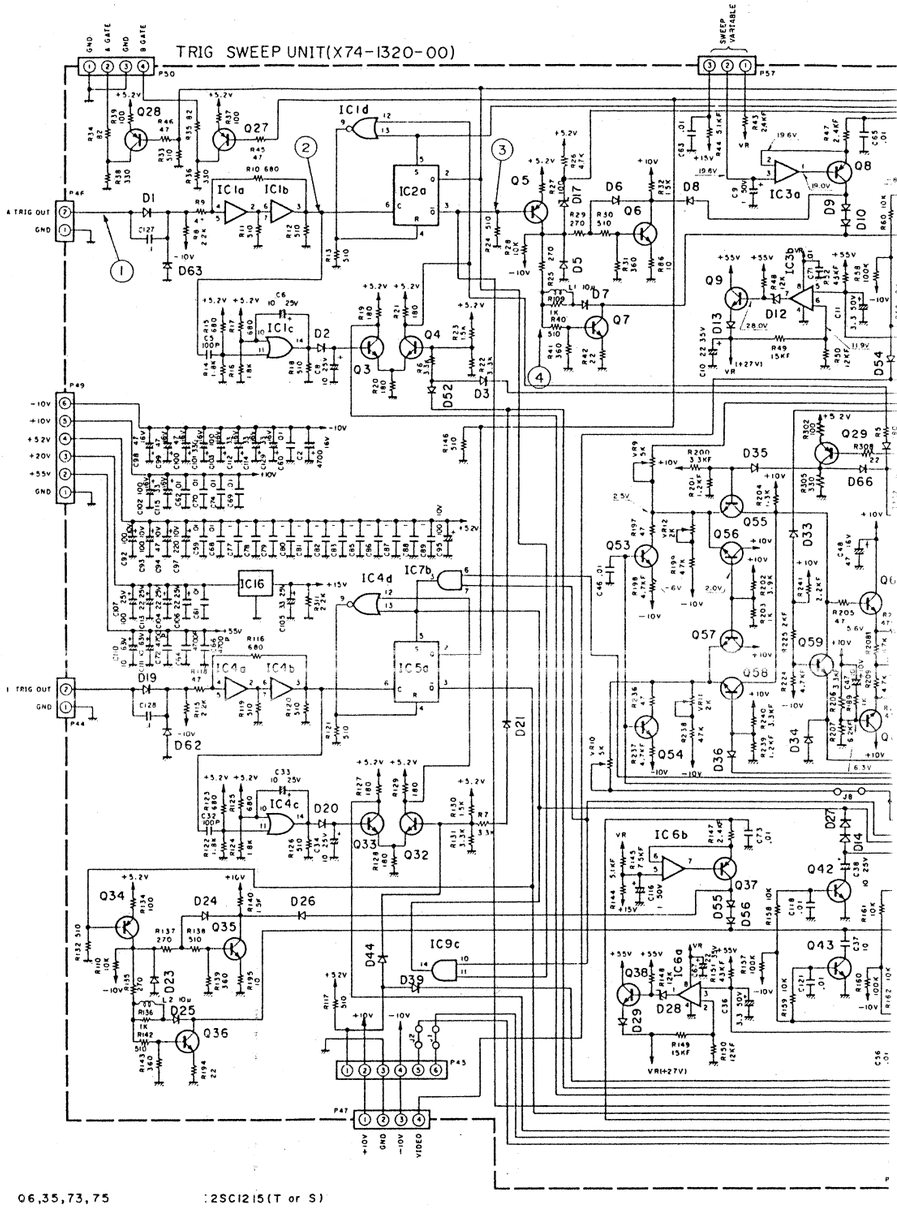
⑬-2 11.4V / 9.3V

⑭-1 0.8Vp-p
(H. DISPLAY: X-Y)

⑭-2 11.5V / 9.6V

⑮ 0V / −1.1V
H. DISPLAY: ALT
▲▼TRACE SEP: Fully CCW

⑯ −6.6V / −7.3V
H. DISPLAY: ALT



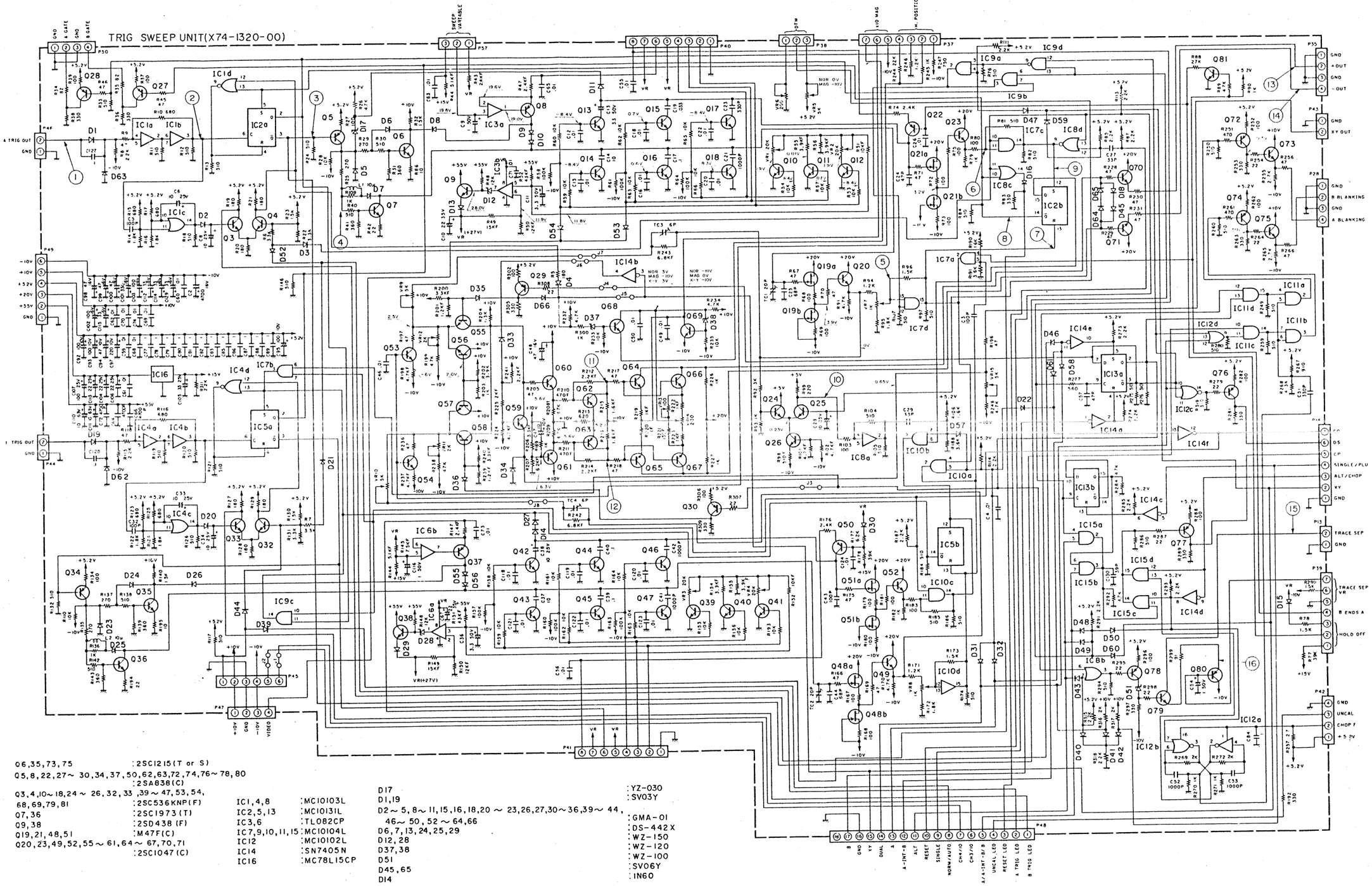

Q6,35,73,75 :2SC1215(T or S)
Q5,8,22,27~30,34,37,50,62,63,72,74,76~78,80 :2SA838(C)
Q3,4,10~18,24~26,32,33,39~47,53,54,68,69,79,81 :2SC536KNP(F)
Q7,36 :2SC1973(T)
Q9,38 :2SD438(F)
Q19,21,48,51 :M47F(C)
Q20,23,49,52,55~61,64~67,70,71 :2SC1047(C)

IC1,4,8 :MC10103L
IC2,5,13 :MC10131L
IC3,6 :TL082CP
IC7,9,10,11,15 :MC10104L
IC12 :MC10102L
IC14 :SN7405N
IC16 :MC78L15CP

D17
D1,19
D2~5,8~11,15,16,18,20~23,26,27,30~46~50,52~64,66
D6,7,13,24,25,29
D12,28
D37,38
D51
D45,65
D14

# SCHEMATIC DIAGRAM

(CS-2100A)



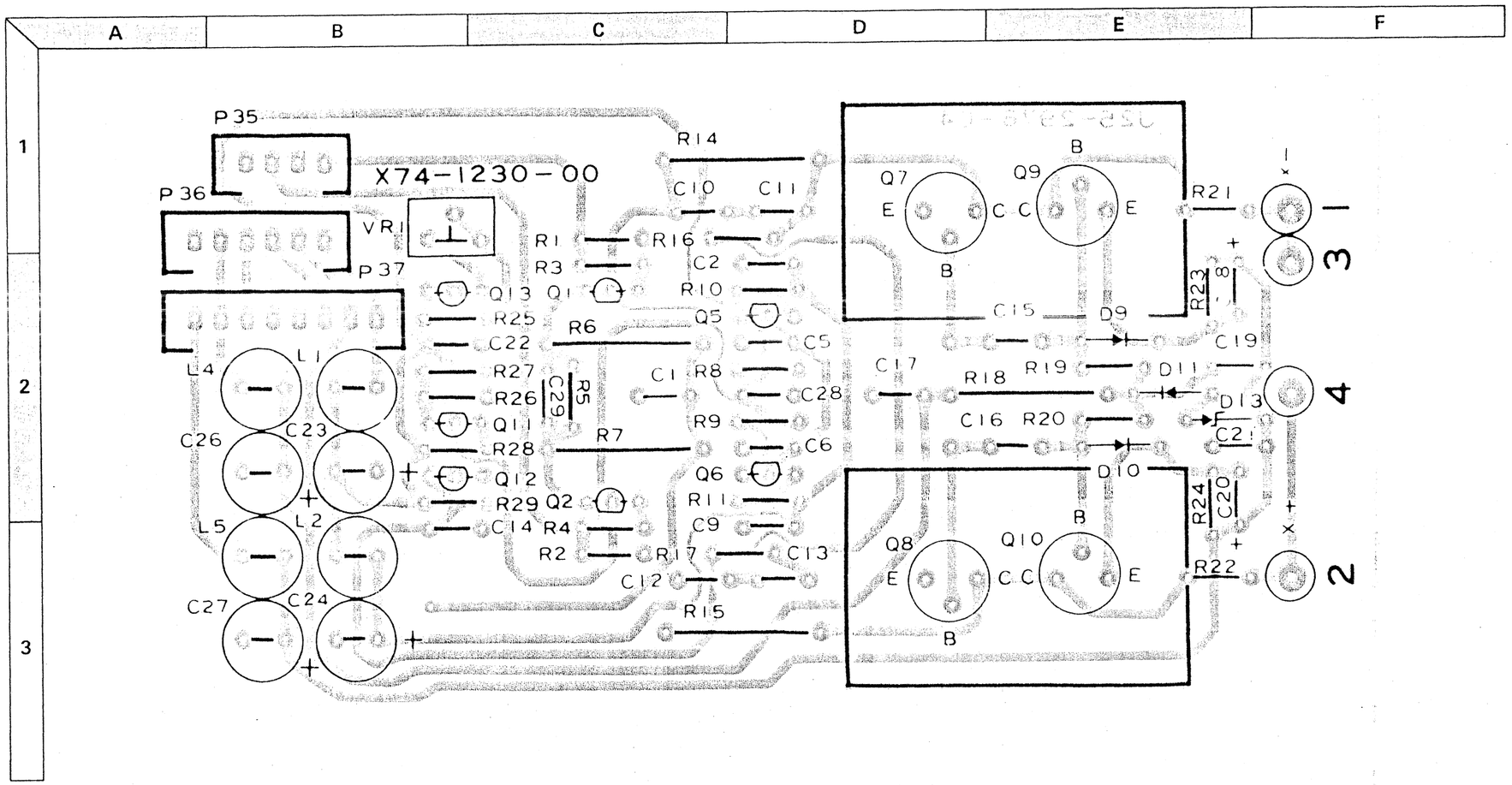

Q6,35,73,75 :2SC1215(T or S)
Q5,8,22,27~30,34,37,50,62,63,72,74,76~78,80 :2SA838(C)
Q3,4,10~18,24~26,32,33,39~47,53,54,68,69,79,81 :2SC536KNP(F)
Q7,36 :2SC1973(T)
Q9,38 :2SD438(F)
Q19,21,48,51 :M47F(C)
Q20,23,49,52,55~61,64~67,70,71 :2SC1047(C)

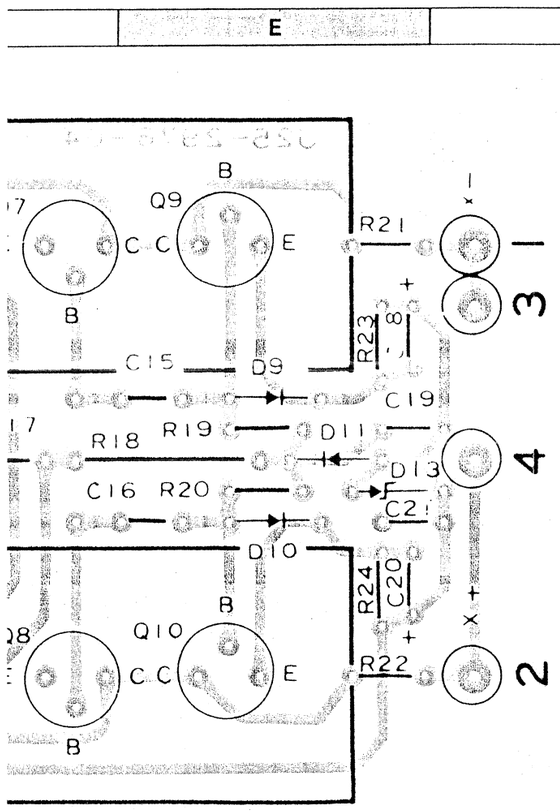
IC1,4,8 :MC10103L
IC2,5,13 :MC10131L
IC3,6 :TL082CP
IC7,9,10,11,15 :MC10104L
IC12 :MC10102L
IC14 :SN7405N
IC16 :MC78L15CP

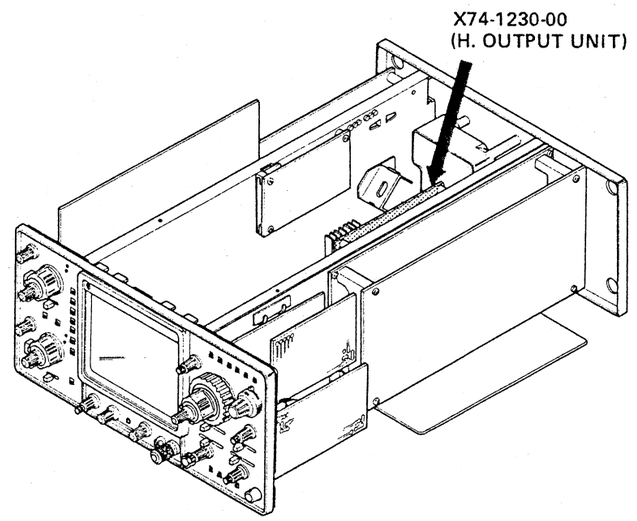
D17 :YZ-030
D1,19 :SV03Y
D2~5,8~11,15,16,18,20~23,26,27,30~36,39~44,46~50,52~64,66 :GMA-01
D6,7,13,24,25,29 :DS-442X
D12,28 :WZ-150
D37,38 :WZ-120
D51 :WZ-100
D45,65 :SV06Y
D14 :1N60

# PC BOARD

X74-1230-00

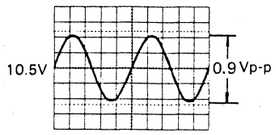



E
F
B
Q9
C C
E
B
R21
3
C15
D9
R23
C19
R18
R19
D11
D13
C16
R20
C21
D10
R24
C20
B
Q10
C C
E
B
R22
2
4


X74-1230-00
(H. OUTPUT UNIT)

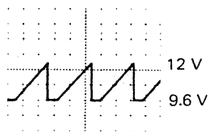
# WAVEFORMS

①-1

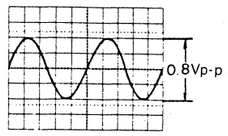



H.DISPLAY: X-Y

①-2

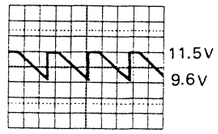



②-1

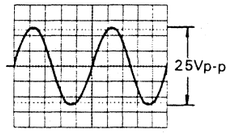



H.DISPLAY :X-Y

②-2

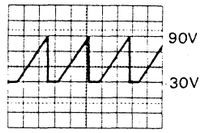



③-1 ④-1

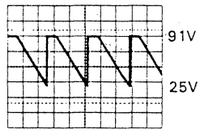



H.DISPLAY: X-Y

③-2

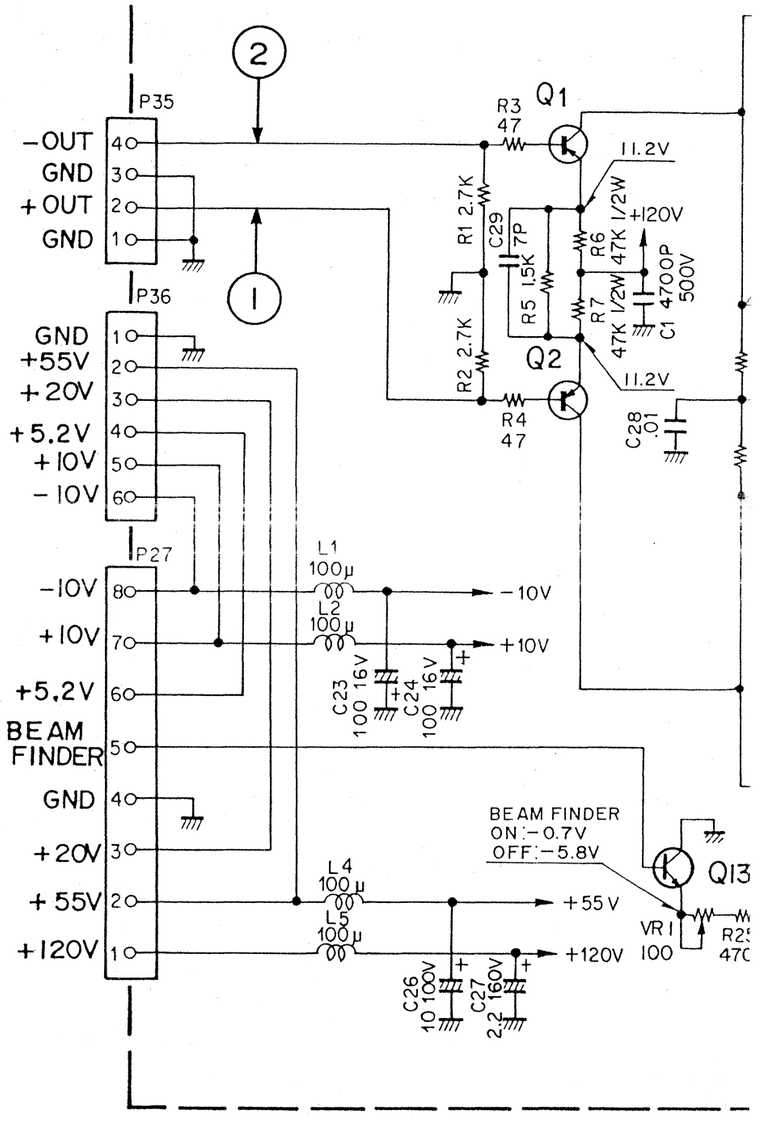



④-2

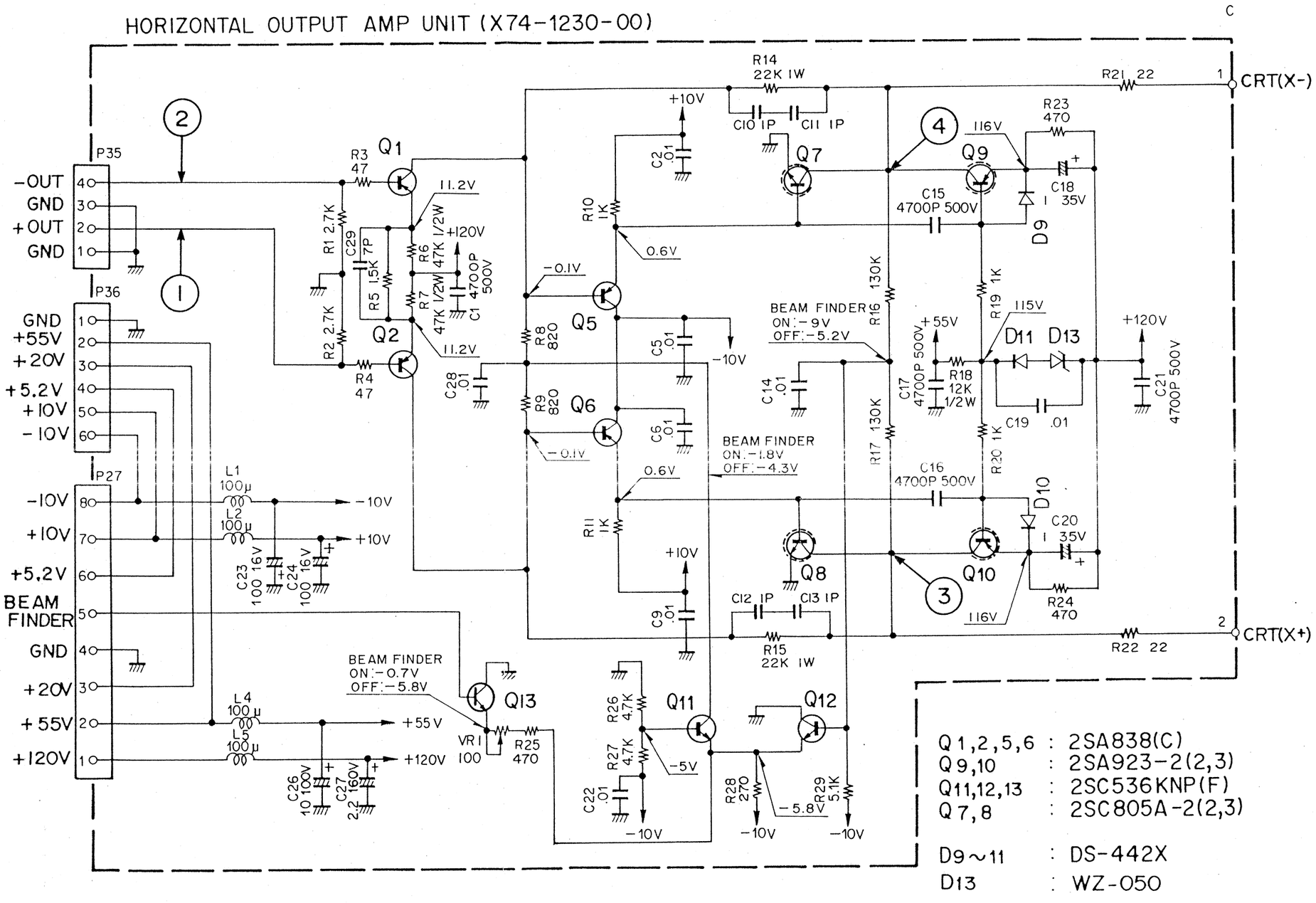





HORIZONTAL OUTPUT AMP UNIT (X74

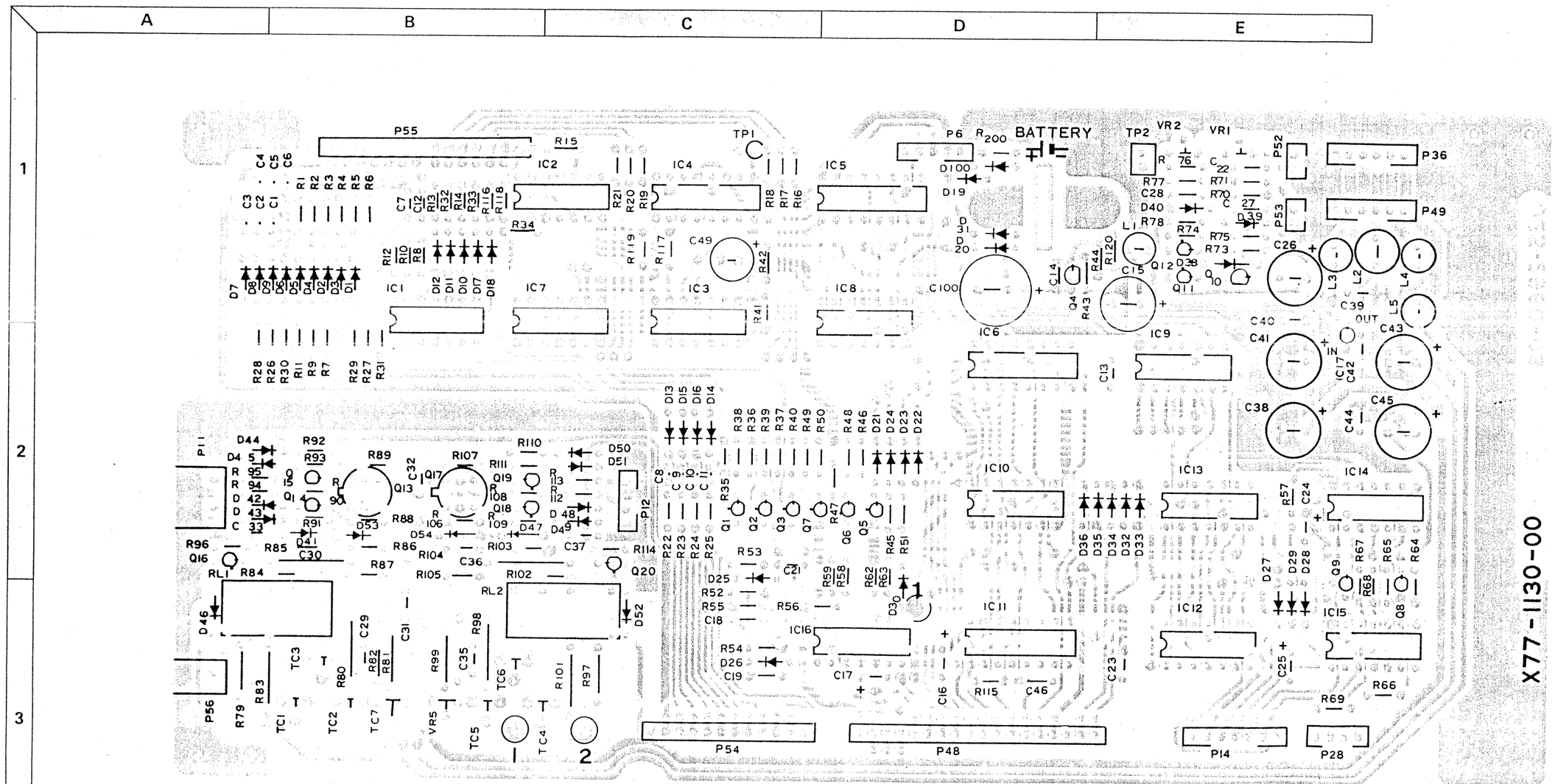


# SCHEMATIC DIAGRAM

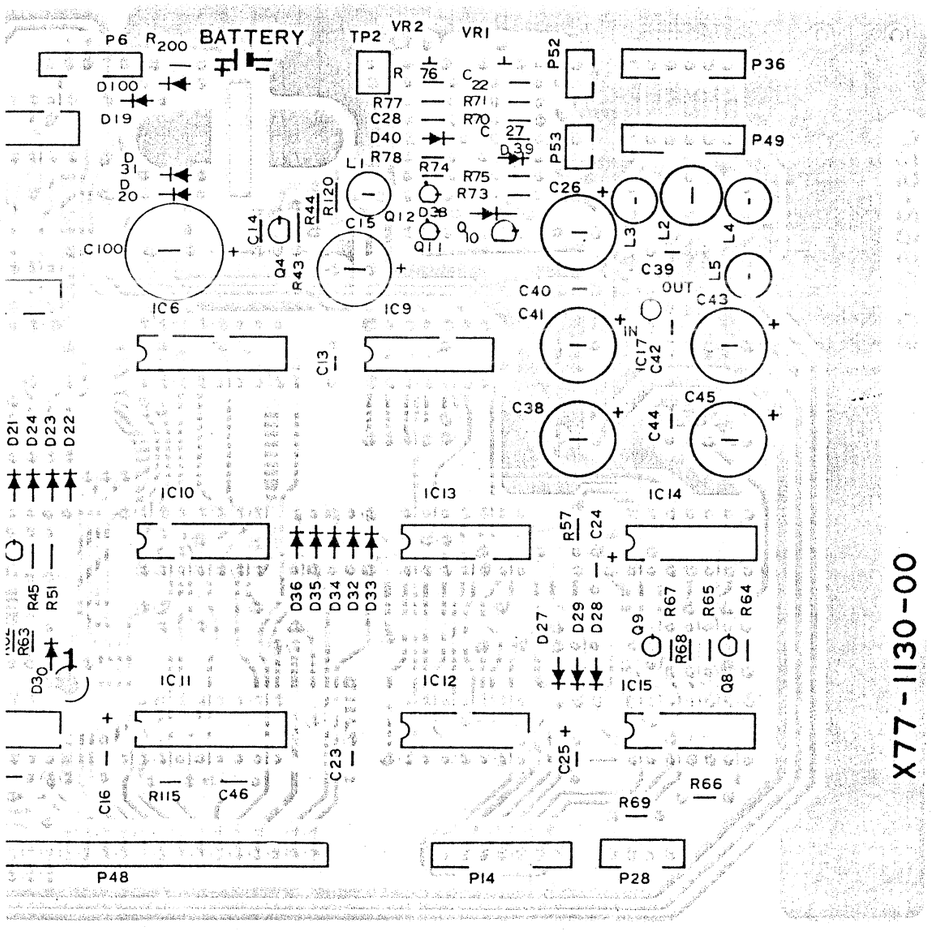


# PC BOARD

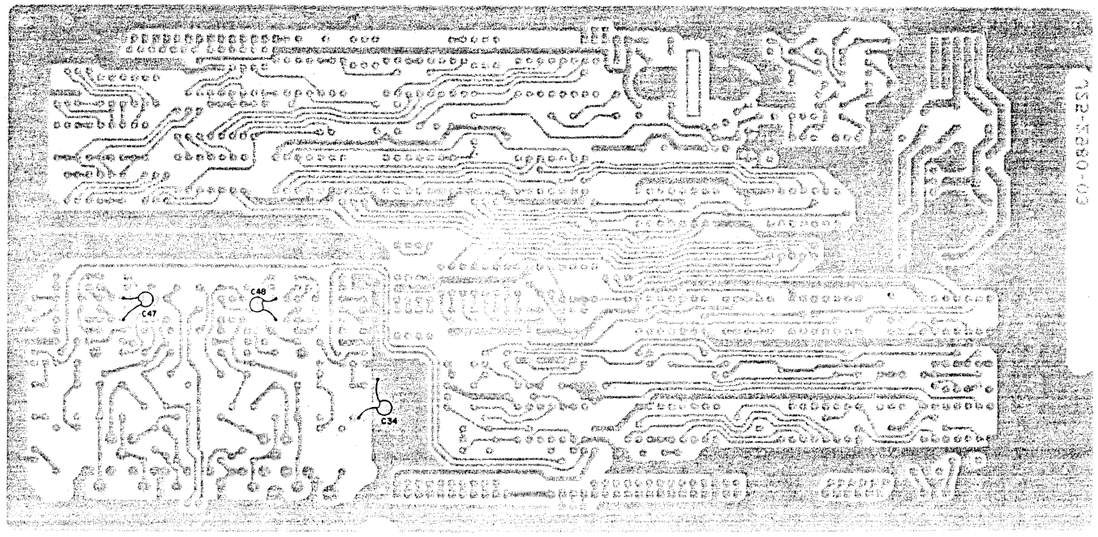
7-1130-00



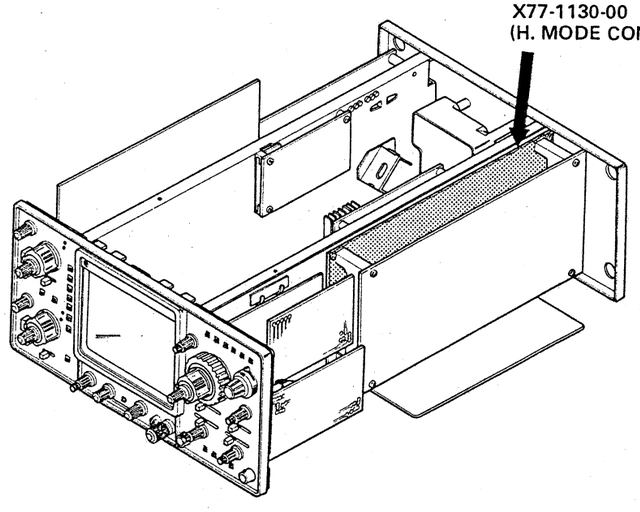
| D | E |
|---|---|




X77-1130-00

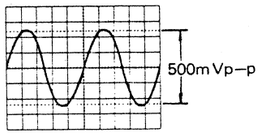



(Foil Side View)

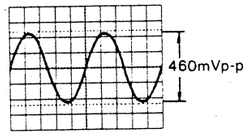


# WAVEFORMS

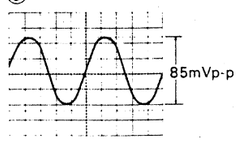
①




②③④

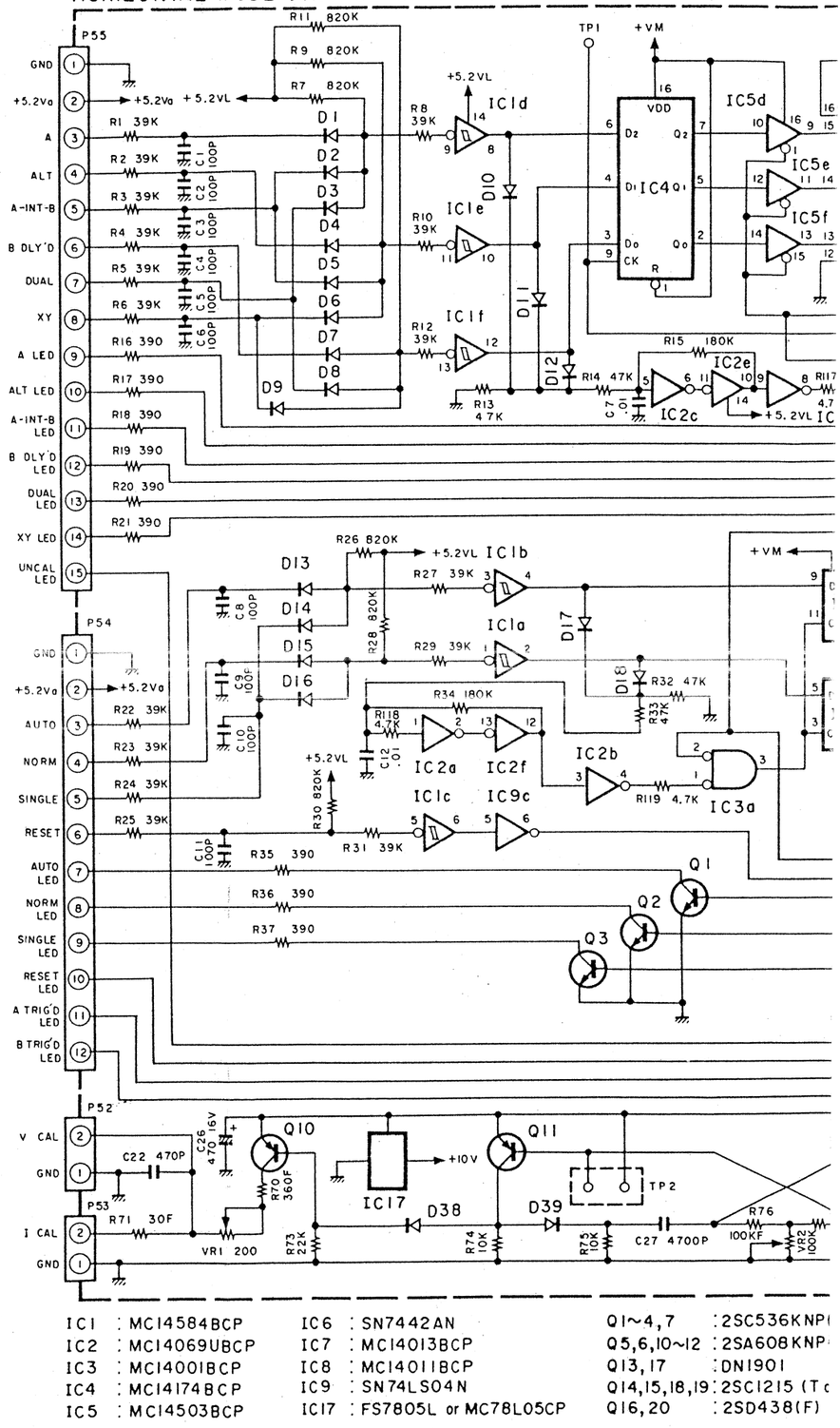



⑤



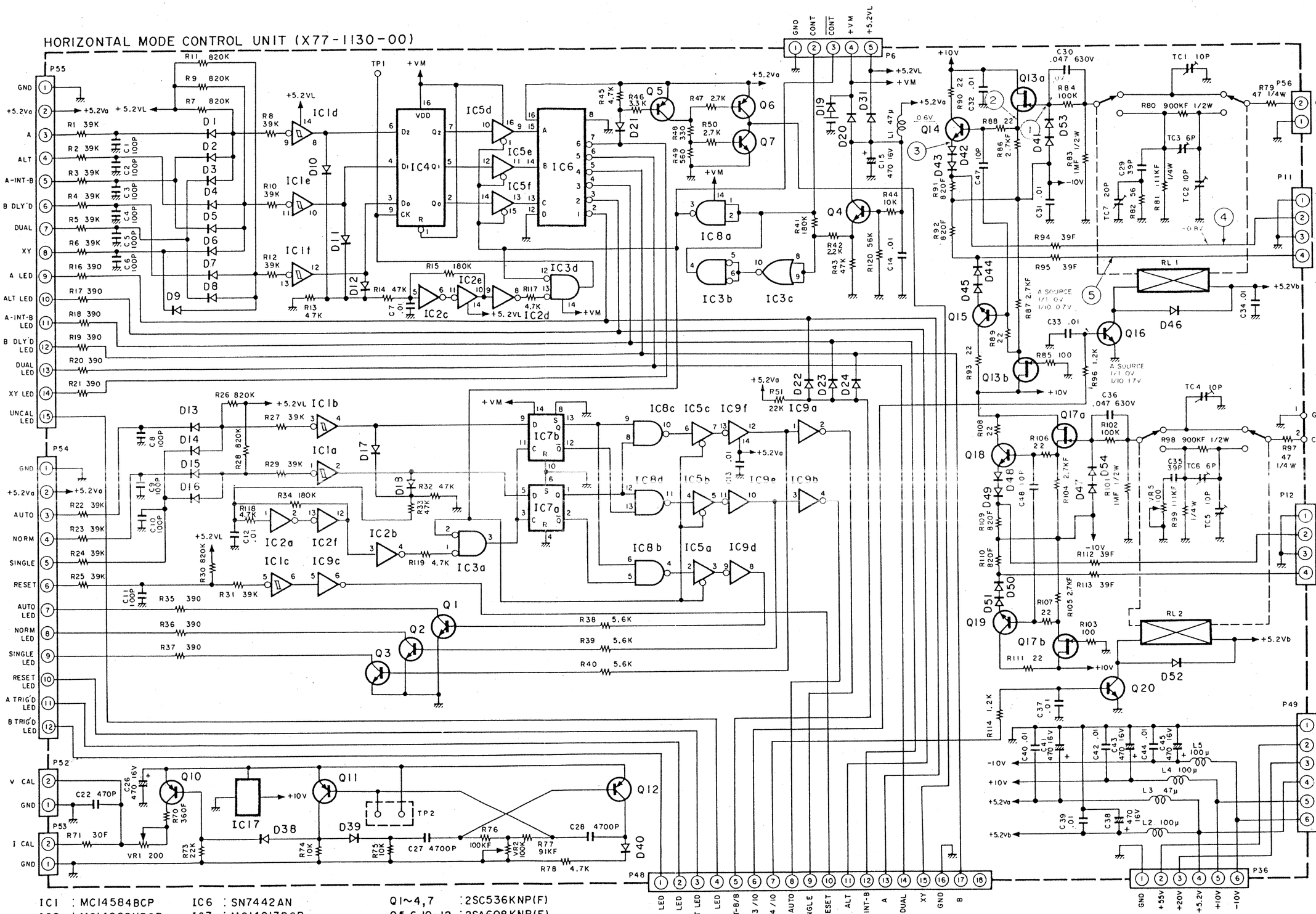



## HORIZONTAL MODE CONTROL UNIT (X77-1130-00)




| | | | | | |
|---|---|---|---|---|---|
| IC1 | : MC14584BCP | IC6 | : SN7442AN | Q1~4,7 | : 2SC536KNP( |
| IC2 | : MC14069UBCP | IC7 | : MC14013BCP | Q5,6,10~12 | : 2SA608KNP |
| IC3 | : MC14001BCP | IC8 | : MC14011BCP | Q13,17 | : DN1901 |
| IC4 | : MC14174BCP | IC9 | : SN74LS04N | Q14,15,18,19 | : 2SC1215 (T |
| IC5 | : MC14503BCP | IC17 | : FS7805L or MC78L05CP | Q16,20 | : 2SD438(F) |

# HORIZONTAL MODE CONTROL UNIT (X77-1130-00)

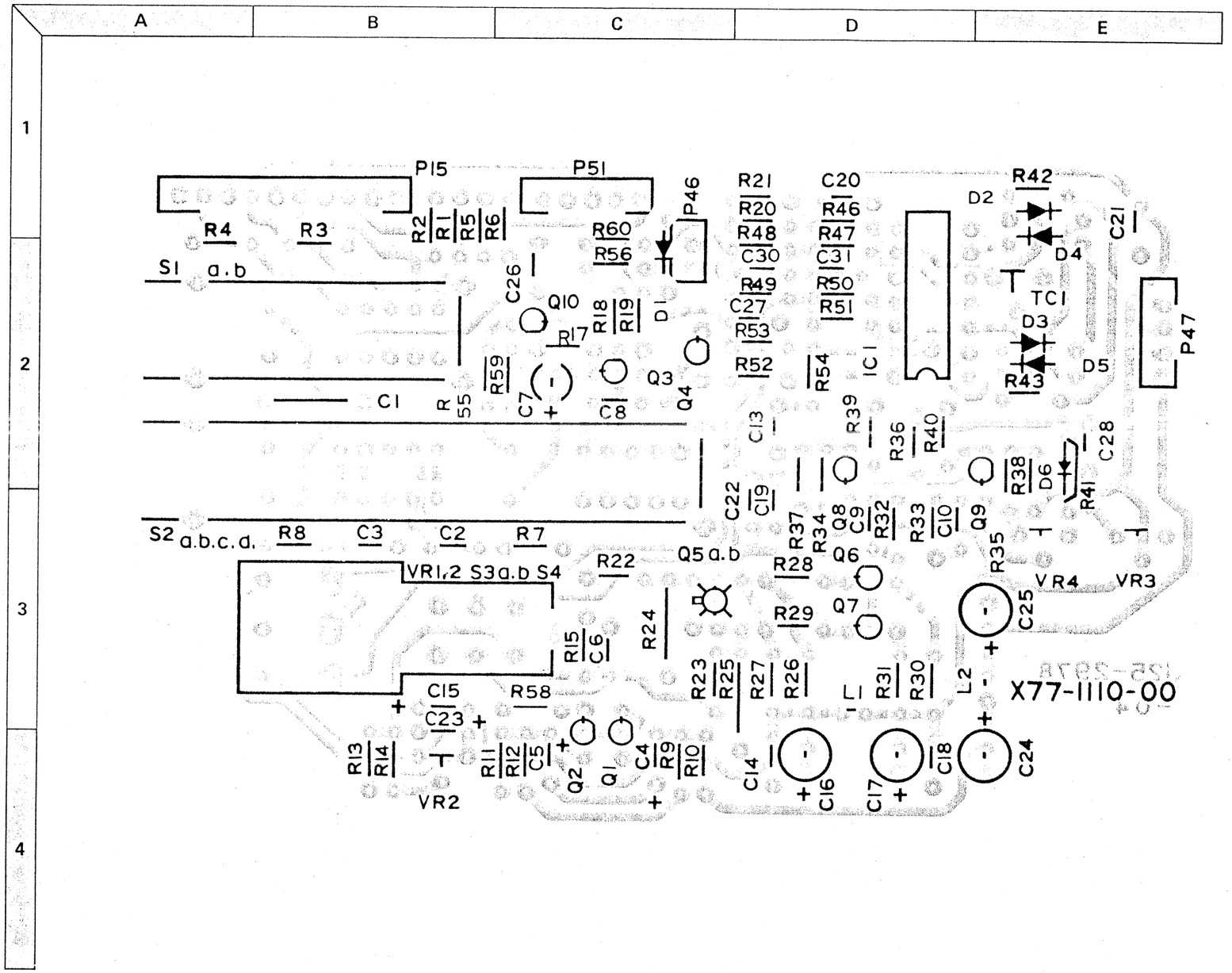


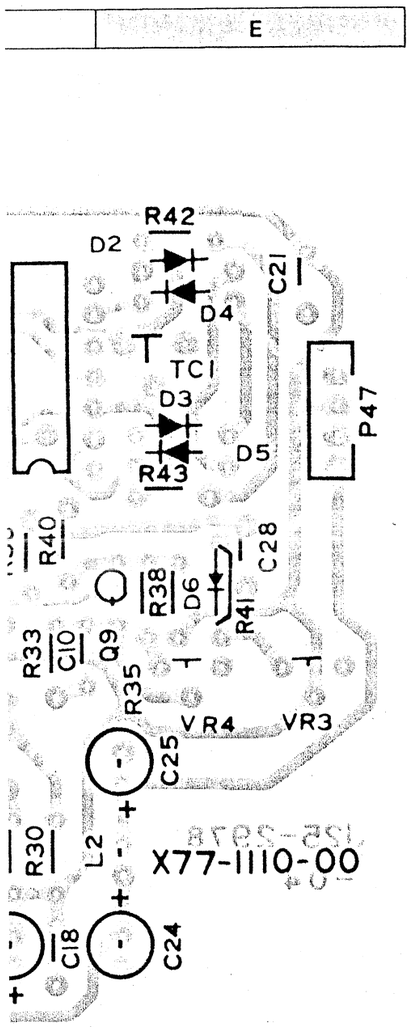

| | | | | | |
|---|---|---|---|---|---|
| IC1 | : MC14584BCP | IC6 | : SN7442AN | Q1~4,7 | : 2SC536KNP(F) |
| IC2 | : MC14069UBCP | IC7 | : MC14013BCP | Q5,6,10~12 | : 2SA608KNP(F) |
| IC3 | : MC14001BCP | IC8 | : MC14011BCP | Q13,17 | : DN1901 |
| IC4 | : MC14174BCP | IC9 | : SN74LS04N | Q14,15,18,19 | : 2SC1215 (T or S) |
| IC5 | : MC14503BCP | IC17 | : FS7805L or MC78L05CP | Q16,20 | : 2SD438(F) |

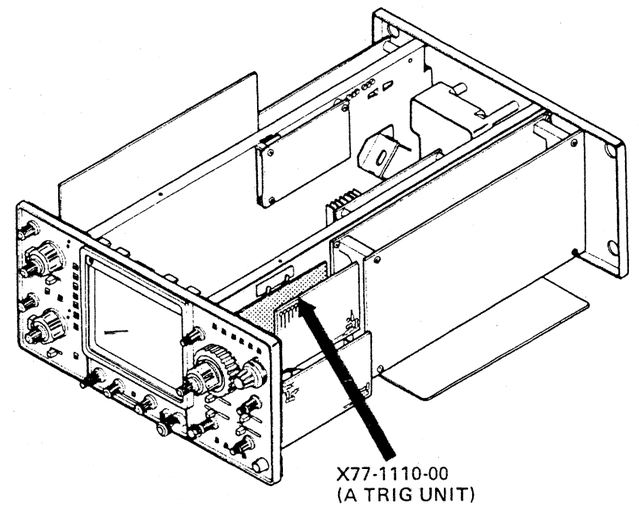
D1~24, 31, 39, 40, 42~46, 48~54 : DS442X
D38 : IN60
D41, 47 : IS1544A

# PC BOARD

1110-00

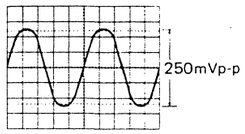



E
R42
D2
C21
D4
TC1
D3
P47
D5
R43
R40
R38
D6
R41
C28
R33
C10
Q9
R35
VR4
VR3
C25
L2
X77-1110-00
R30
C18
C24

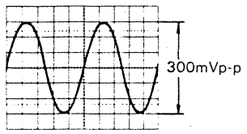

X77-1110-00
(A TRIG UNIT)

# WAVEFORMS

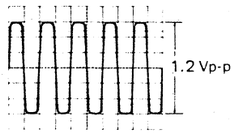
①



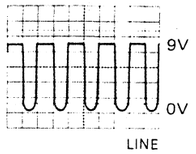

②



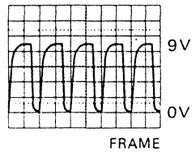

③




④-1

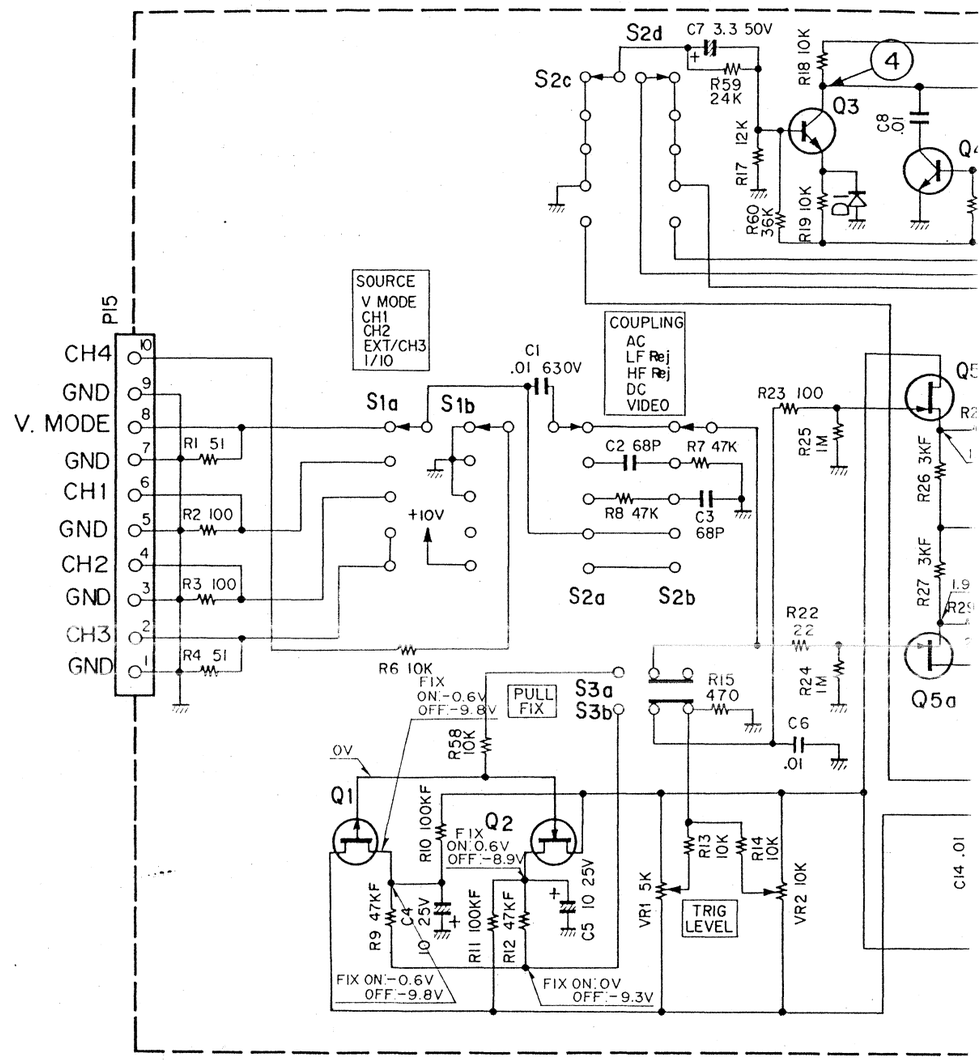



④-2

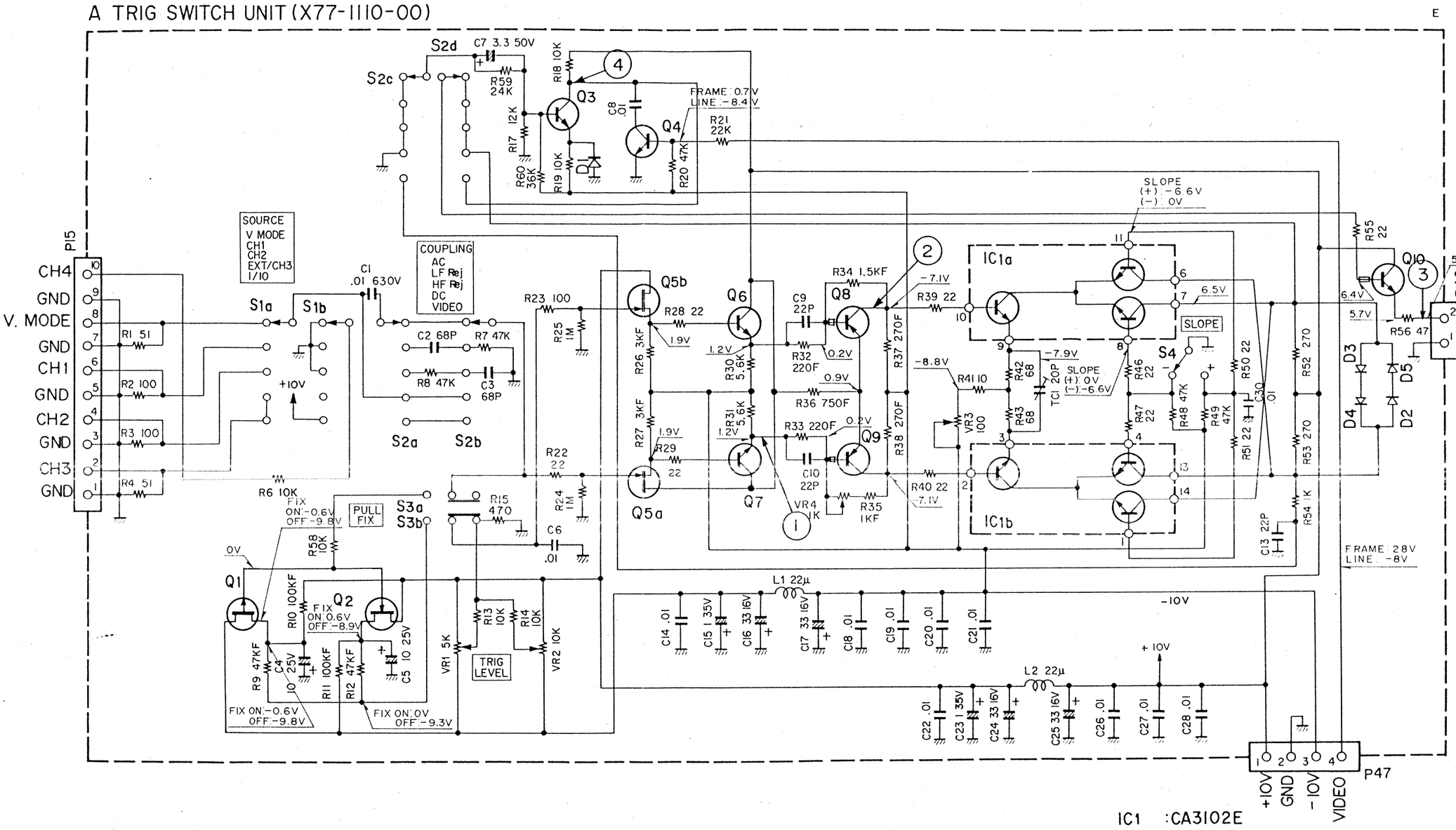





## A TRIG SWITCH UNIT (X77-1110-00)



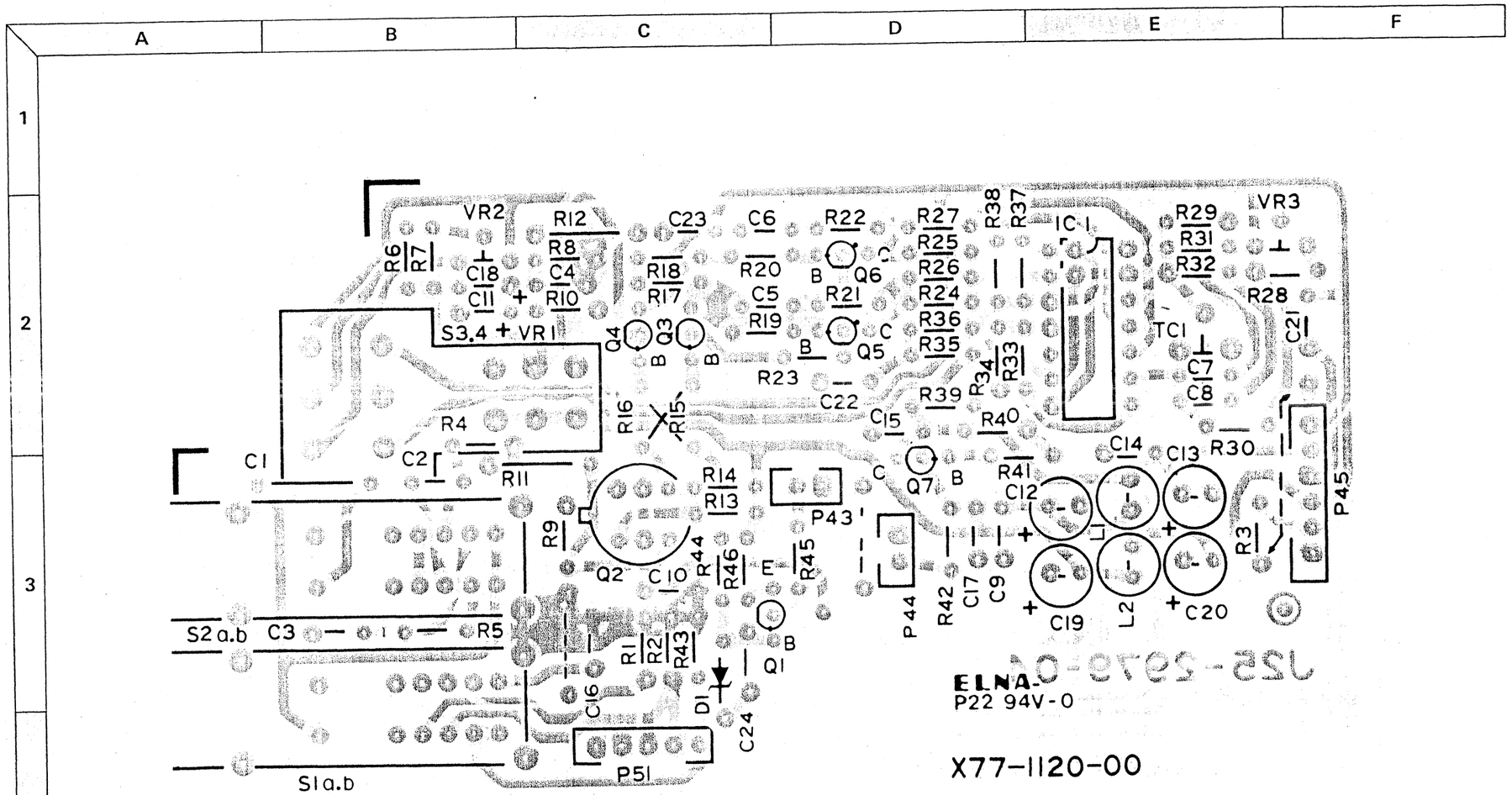
# SCHEMATIC DIAGRAM



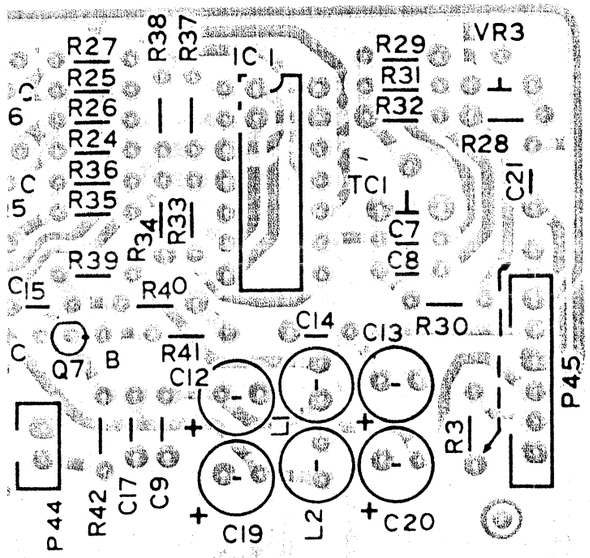

IC1 :CA3102E
Q1 :2SJ43(Q)
Q3,4 :2SC536KNP(F)
Q5 :DN1901
Q6,7 :2SC1215(T or S)
Q8,9 :2SA1161
Q2 :2SK127(Q)
Q10 :2SC2499
D1～5 :DS442X

# PC BOARD

120-00

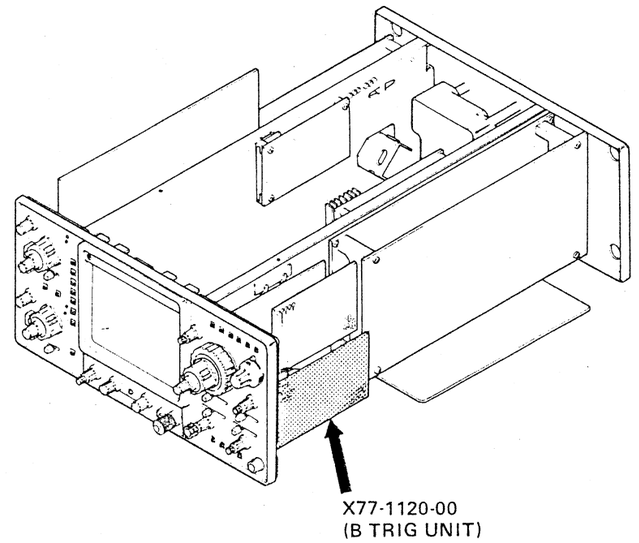


| D | E | F |
|---|---|---|




ELNA
P22 94V-0

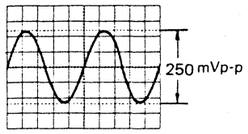
X77-1120-00



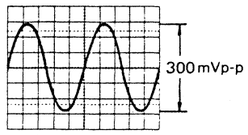
X77-1120-00
(B TRIG UNIT)

# WAVEFORMS

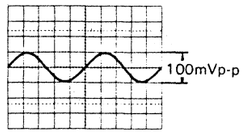
①③④



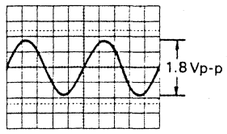

②



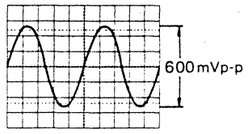

⑥




⑦

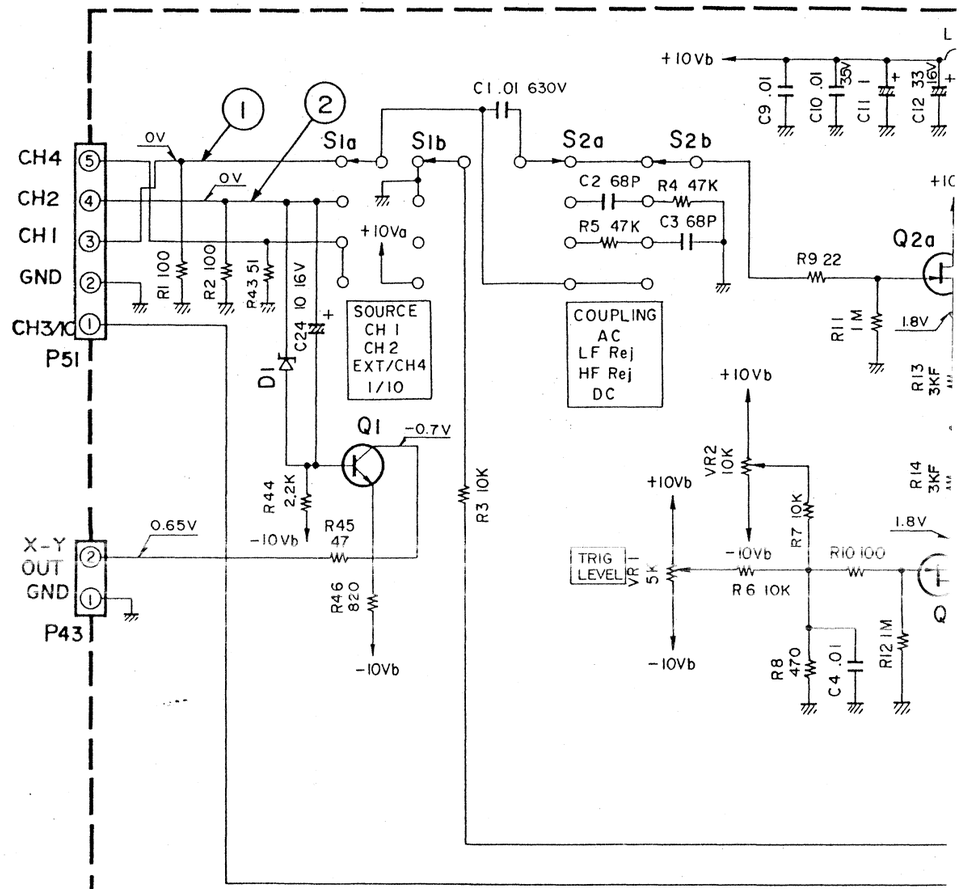



⑤⑧






## B TRIG SWITCH UNIT (X77-1120-00)




IC1 : CA3102E

Q1,3,4 : 2SC1215 T or S

Q2 : DN1901

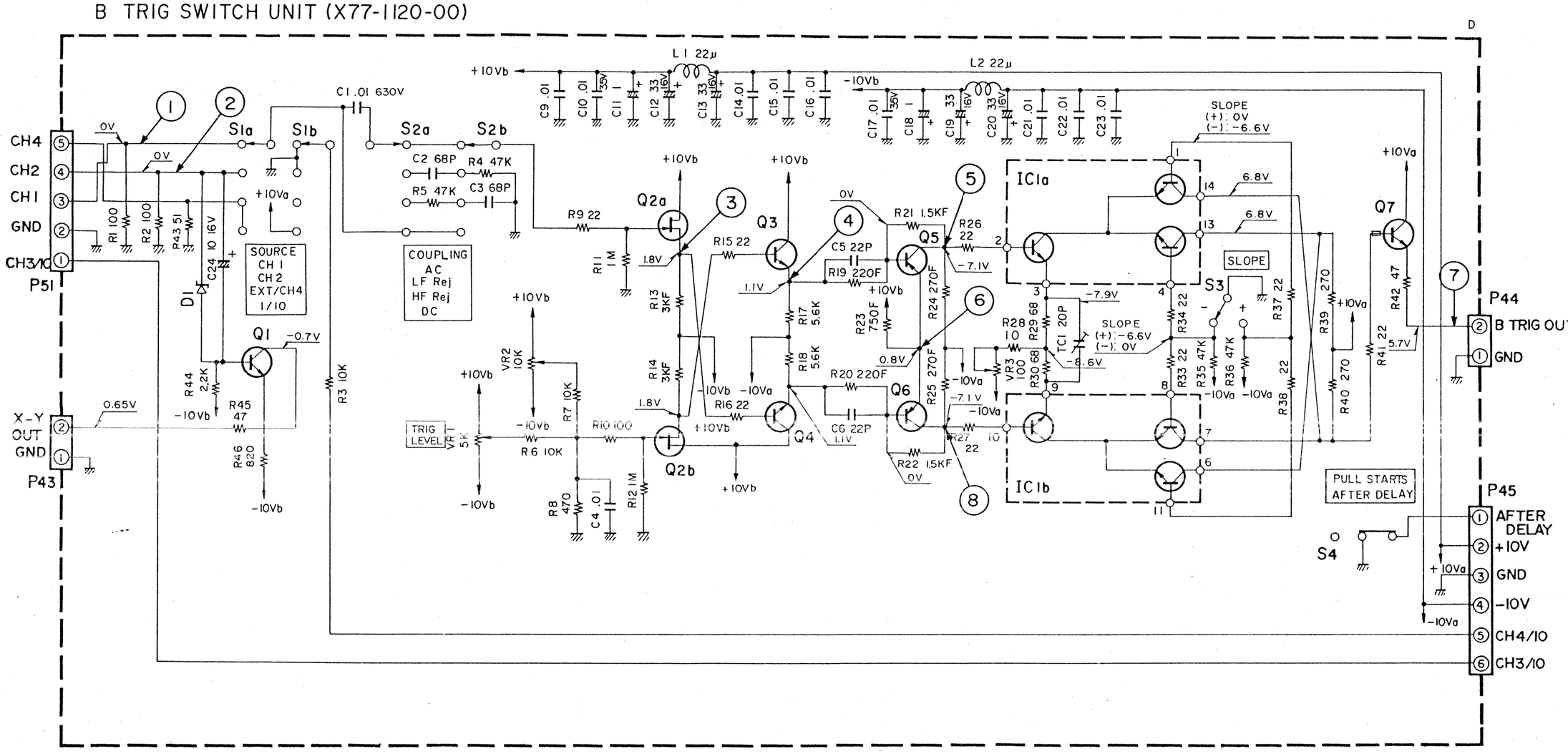
Q7 : 2SC2499

Q5,6 : 2SA

D1 : WZ-

# SCHEMATIC DIAGRAM

## B TRIG SWITCH UNIT (X77-1120-00)




IC1 : CA3102E

Q1,3,4 : 2SC1215TorS

Q2 : DN1901

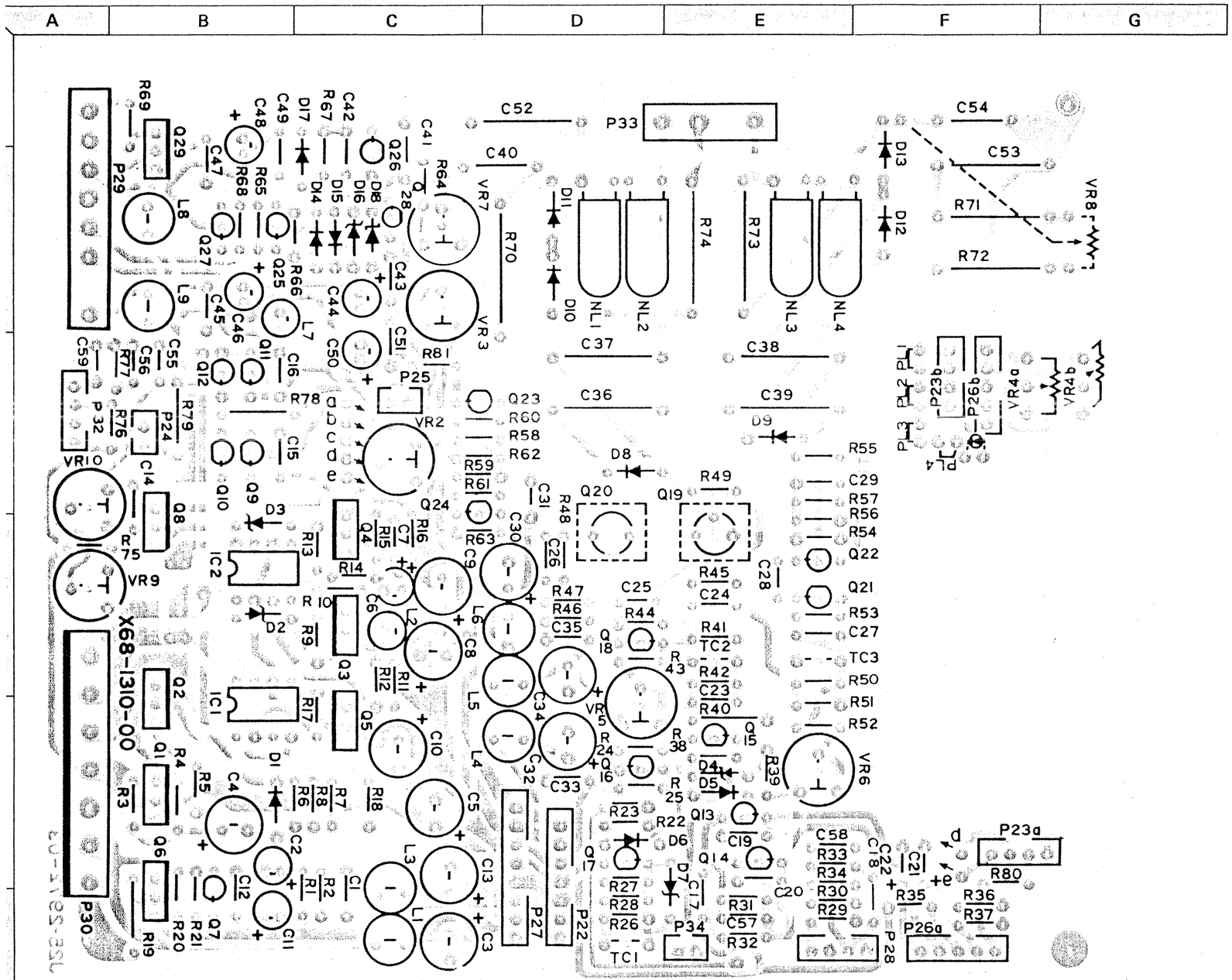
Q7 : 2SC2499

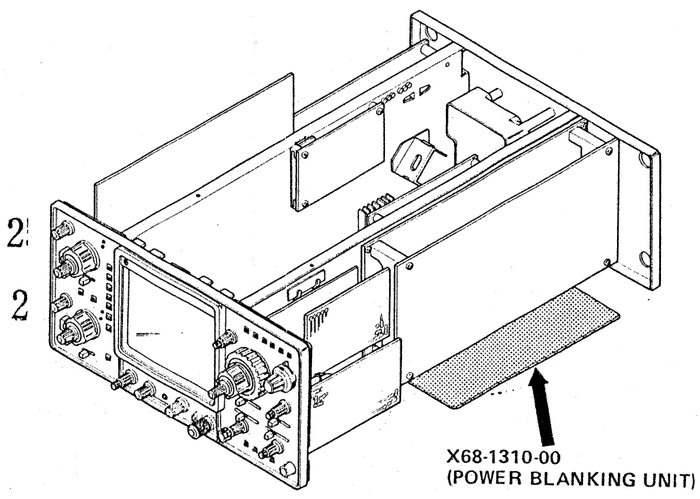
Q5,6 : 2SA1161

D1 : WZ-081

# PC BOARD

3-1310-00



X68-1310-00
(POWER BLANKING UNIT)

G

C54

C53

R71

R72

VR8

P26b

VR4a

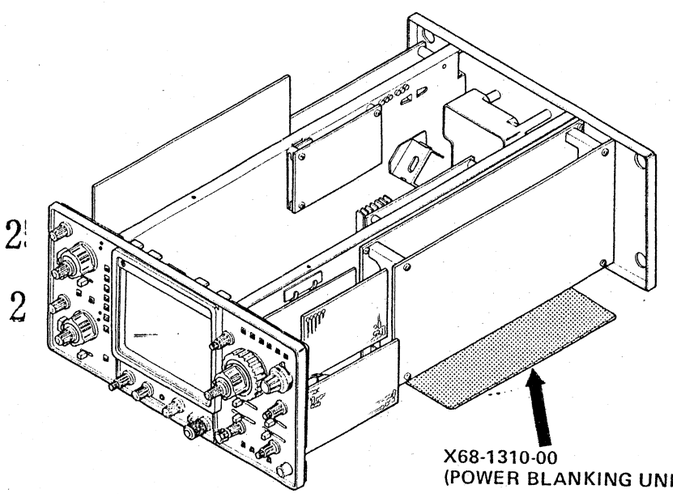
VR4b

P23a

R80

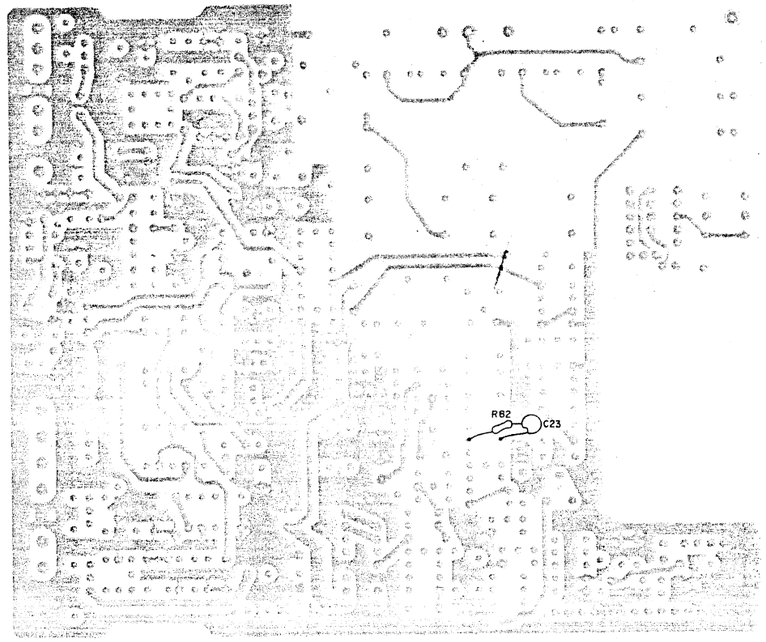
R36

R37

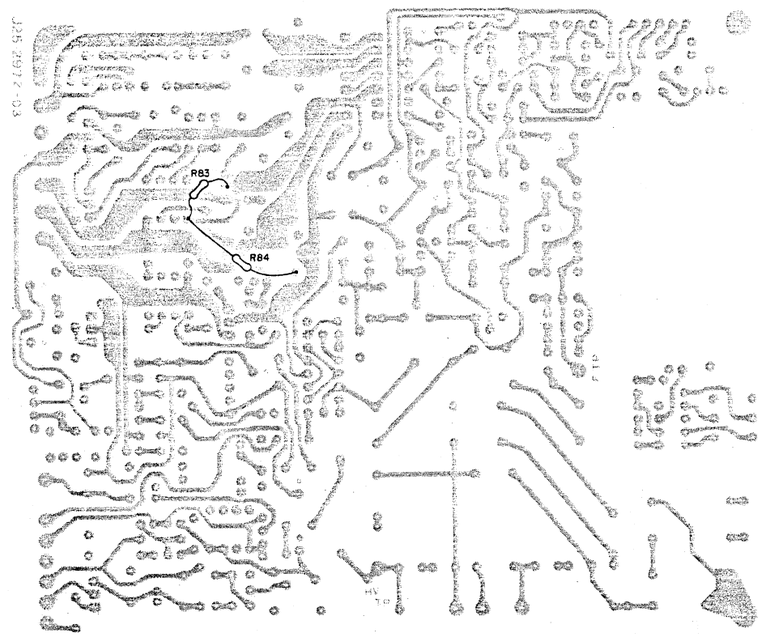


X68-1310-00
(POWER BLANKING UNIT)

X68-1310-00



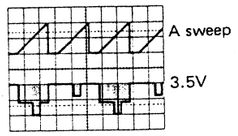

(Parts Side View)




(Foil Side View)

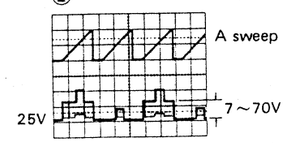
# WAVEFORMS

①



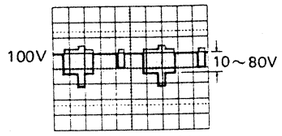

H.DISPLAY :ALT

②



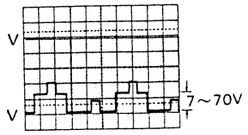

H.DISPLAY : ALT

③



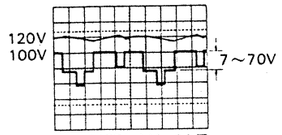

H.DISPLAY: ALT

④



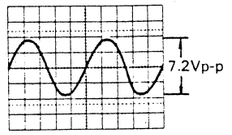

H.DISPLAY: ALT

⑤

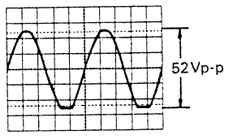



H.DISPLAY: ALT

⑥

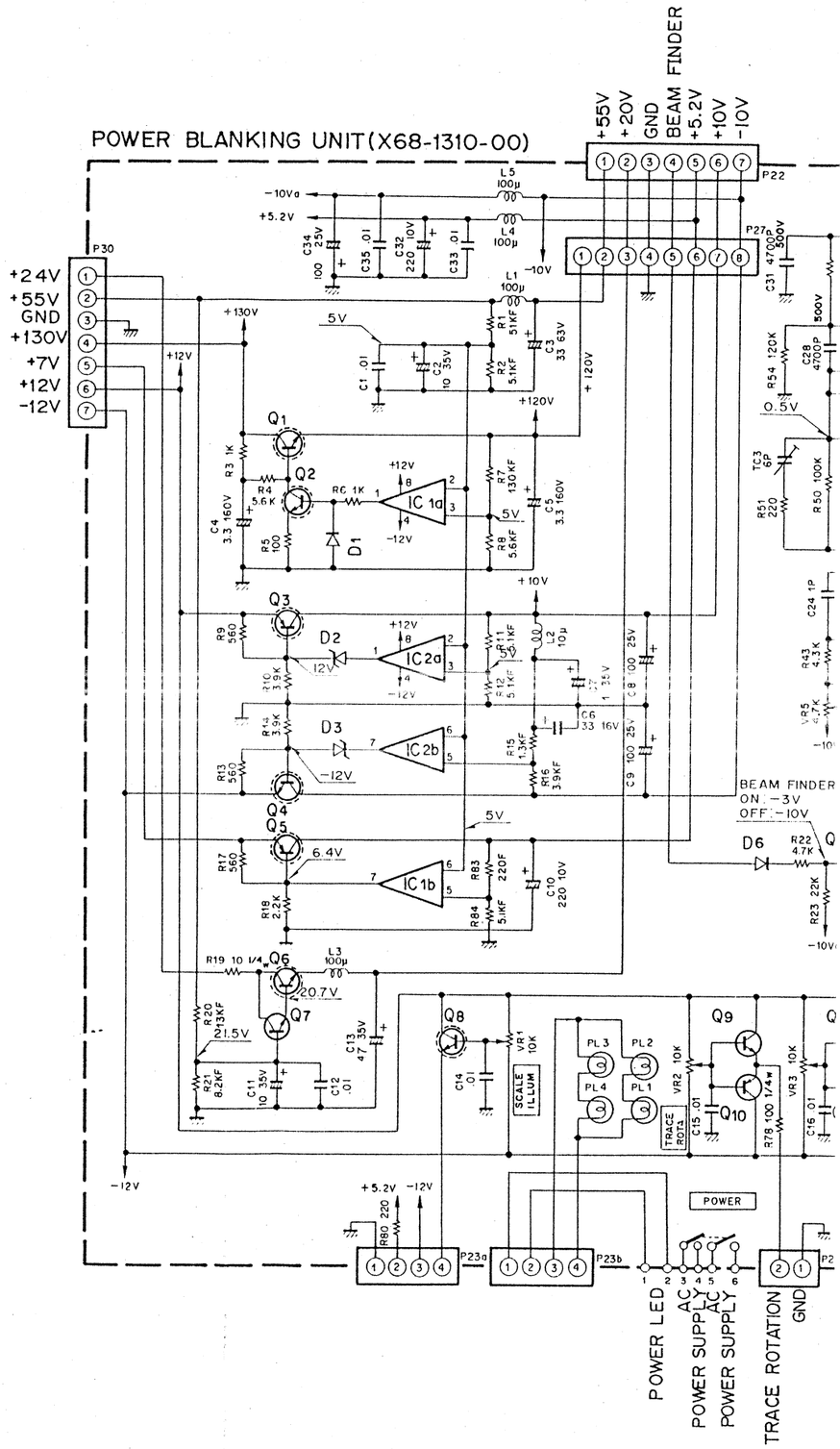



⑦

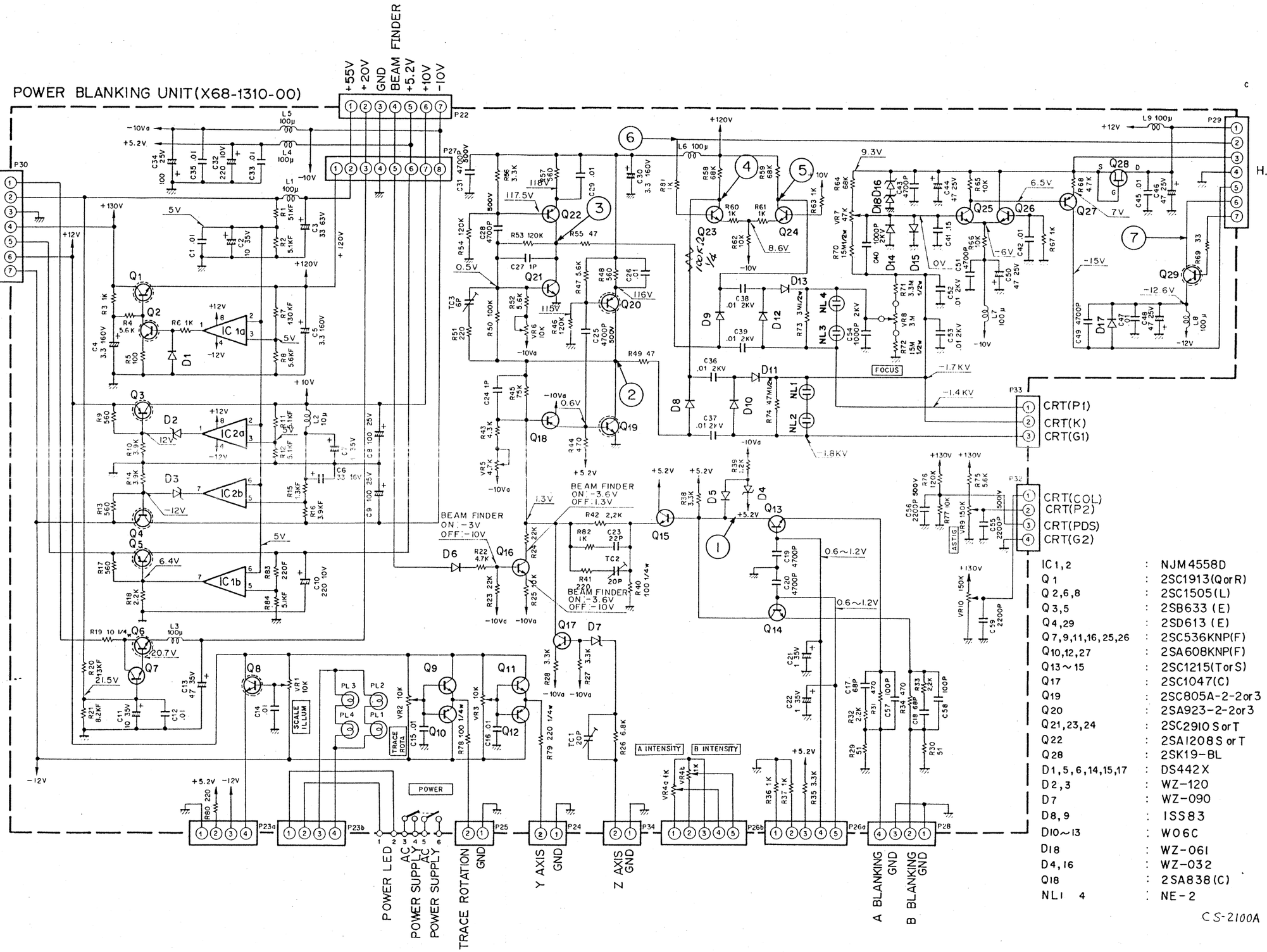



Note: ▓▓▓ : CHOP Operation





# SCHEMATIC DIAGRAM

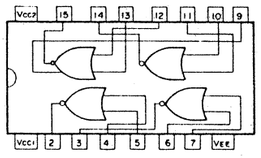



| | | |
|---|---|---|
| IC1,2 | : | NJM4558D |
| Q1 | : | 2SC1913(QorR) |
| Q2,6,8 | : | 2SC1505(L) |
| Q3,5 | : | 2SB633 (E) |
| Q4,29 | : | 2SD613 (E) |
| Q7,9,11,16,25,26 | : | 2SC536KNP(F) |
| Q10,12,27 | : | 2SA608KNP(F) |
| Q13~15 | : | 2SC1215(TorS) |
| Q17 | : | 2SC1047(C) |
| Q19 | : | 2SC805A-2-2or3 |
| Q20 | : | 2SA923-2-2or3 |
| Q21,23,24 | : | 2SC2910 S or T |
| Q22 | : | 2SA1208S or T |
| Q28 | : | 2SK19-BL |
| D1,5,6,14,15,17 | : | DS442X |
| D2,3 | : | WZ-120 |
| D7 | : | WZ-090 |
| D8,9 | : | ISS83 |
| D10~13 | : | W06C |
| D18 | : | WZ-061 |
| D4,16 | : | WZ-032 |
| Q18 | : | 2SA838(C) |
| NL1 4 | : | NE-2 |

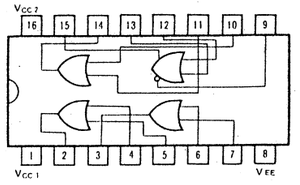
CS-2100A

# SEMICONDUCTORS

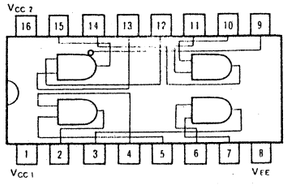
## C-MOS IC



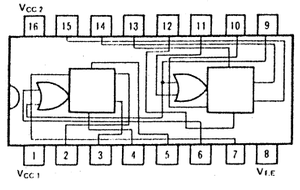
MC10102P



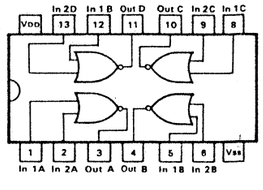
MC10103BCP



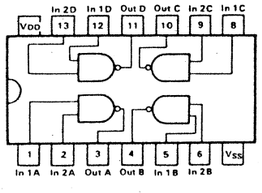
MC10104BCP



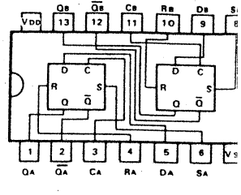
MC10131BCP



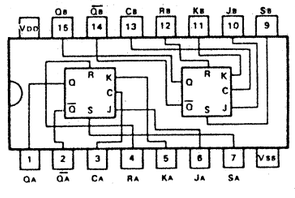
MC14001BCP



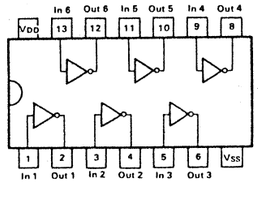
MC14011BCP



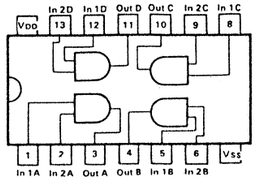
MC14013BCP



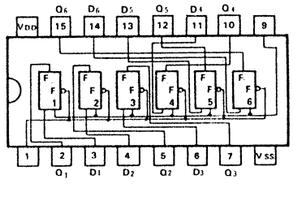
MC14027BCP



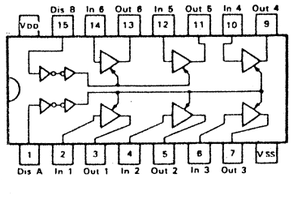
MC14069UBCP



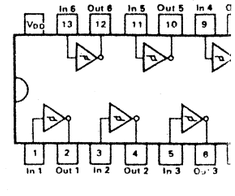
MC14081BCP



MC14174BCP

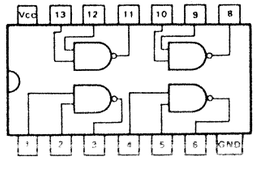


MC14503BCP

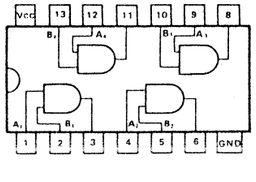


MC14584BCP

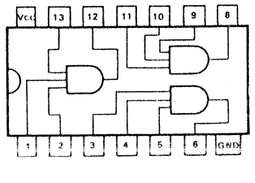
## TTL IC



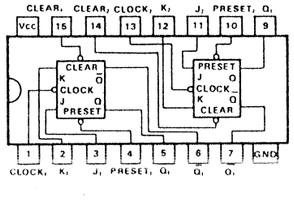
SN74LS00N



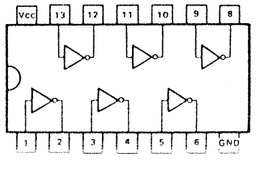
SN74LS08N



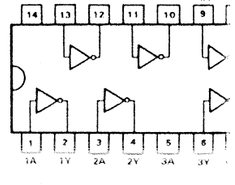
SN74LS11N



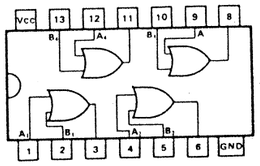
SN74LS112AN



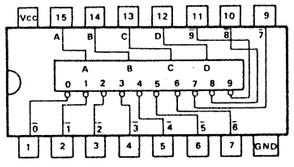
SN7404N
SN74LS04N



SN7405N

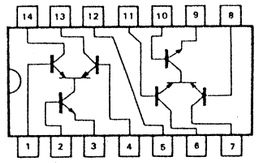


SN7432N
SN74LS32N

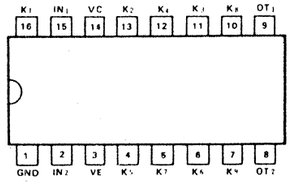


SN7442AN

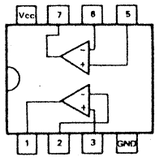
## OTHER



CA3102E

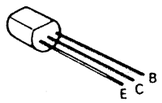


ATM-4010

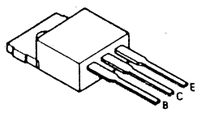


TL082CP
NJM4558D

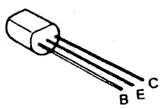
## TRANSISTOR



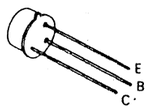
2SA608KNP (F) 2SC1215 (T or S)
2SA838 (C) 2SC1973 (T)
2SD438 (F) 2SC2910 (S or T)
2SC536KNP (F) 2SA1208 (S or T)
2SC1047 (C)



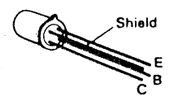
2SB633 (E)
2SD613 (E)
2SC1505 (L)



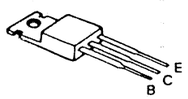
2SA1161
2SC2499
2SC2644



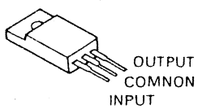
2SA923-2-2 or 3
2SC805A2-2 or 3



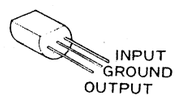

2SC1164 (O)



2SC1913 (Q, R)

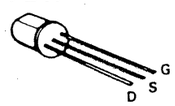



FS7805L

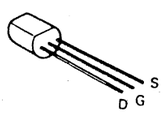



MC78L15CP

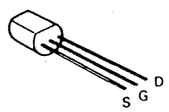
## FET.



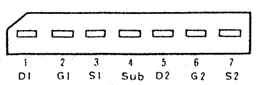
2SK19 (BL)



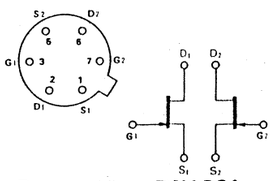
2SK127 (Q)



2SJ43 (Q)



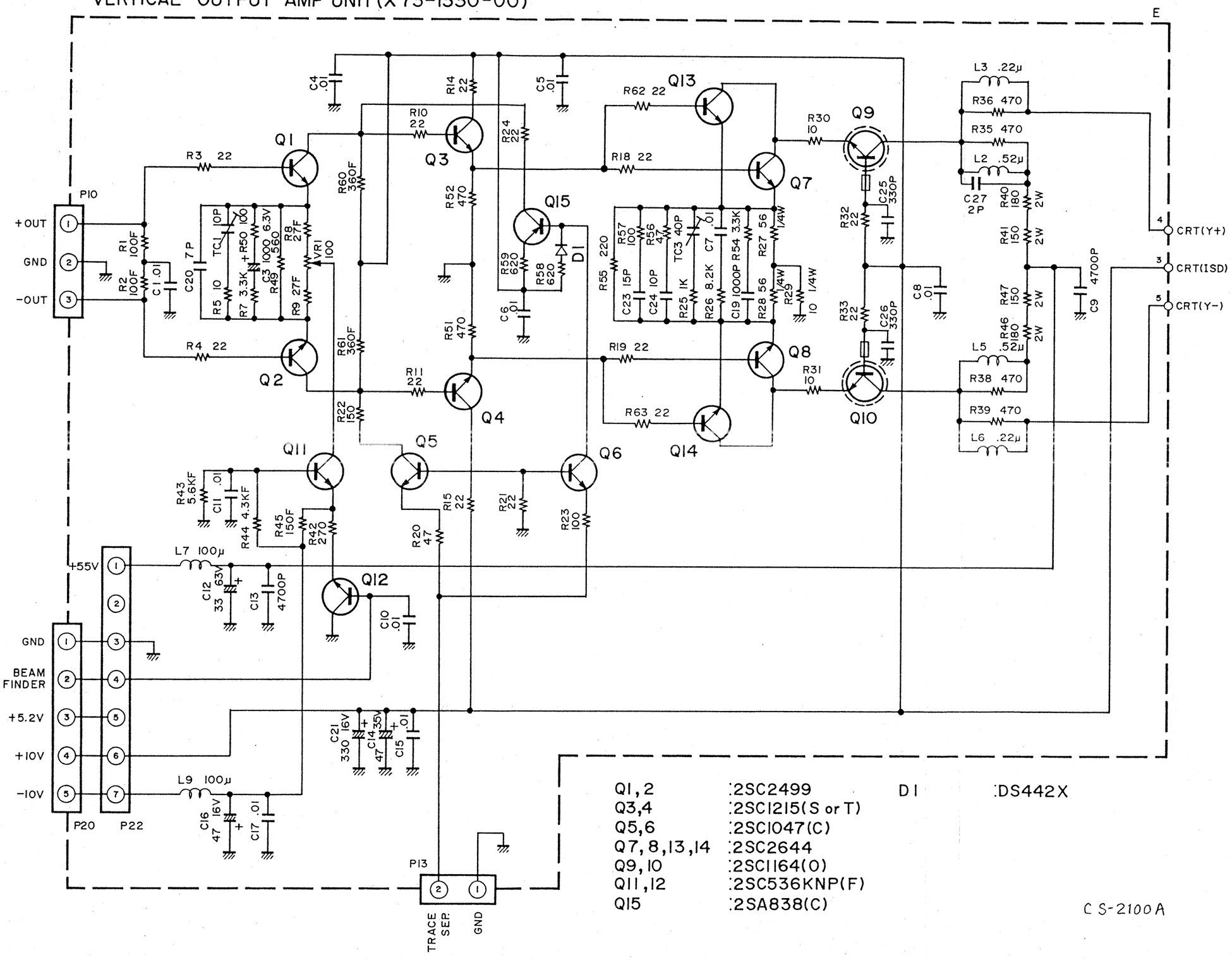
Bottom View M47F (C)



Bottom View DN1901

CS-2100A

# VERTICAL OUTPUT AMP UNIT (X 73-1330-00)

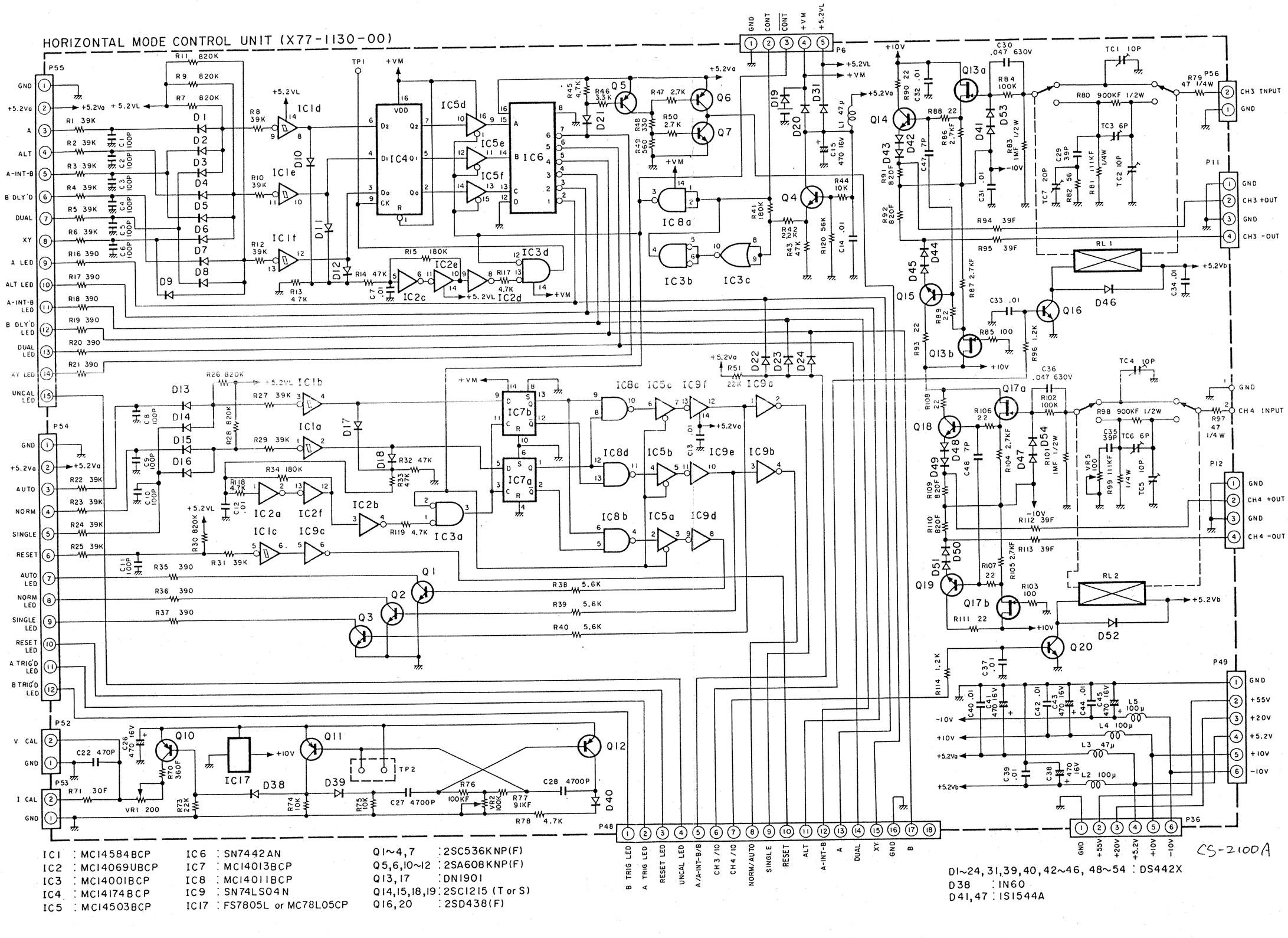



| | | | |
|---|---|---|---|
| Q1,2 | :2SC2499 | D1 | :DS442X |
| Q3,4 | :2SC1215(S or T) | | |
| Q5,6 | :2SC1047(C) | | |
| Q7,8,13,14 | :2SC2644 | | |
| Q9,10 | :2SC1164(O) | | |
| Q11,12 | :2SC536KNP(F) | | |
| Q15 | :2SA838(C) | | |

CS-2100A

A

# HORIZONTAL MODE CONTROL UNIT (X77-1130-00)



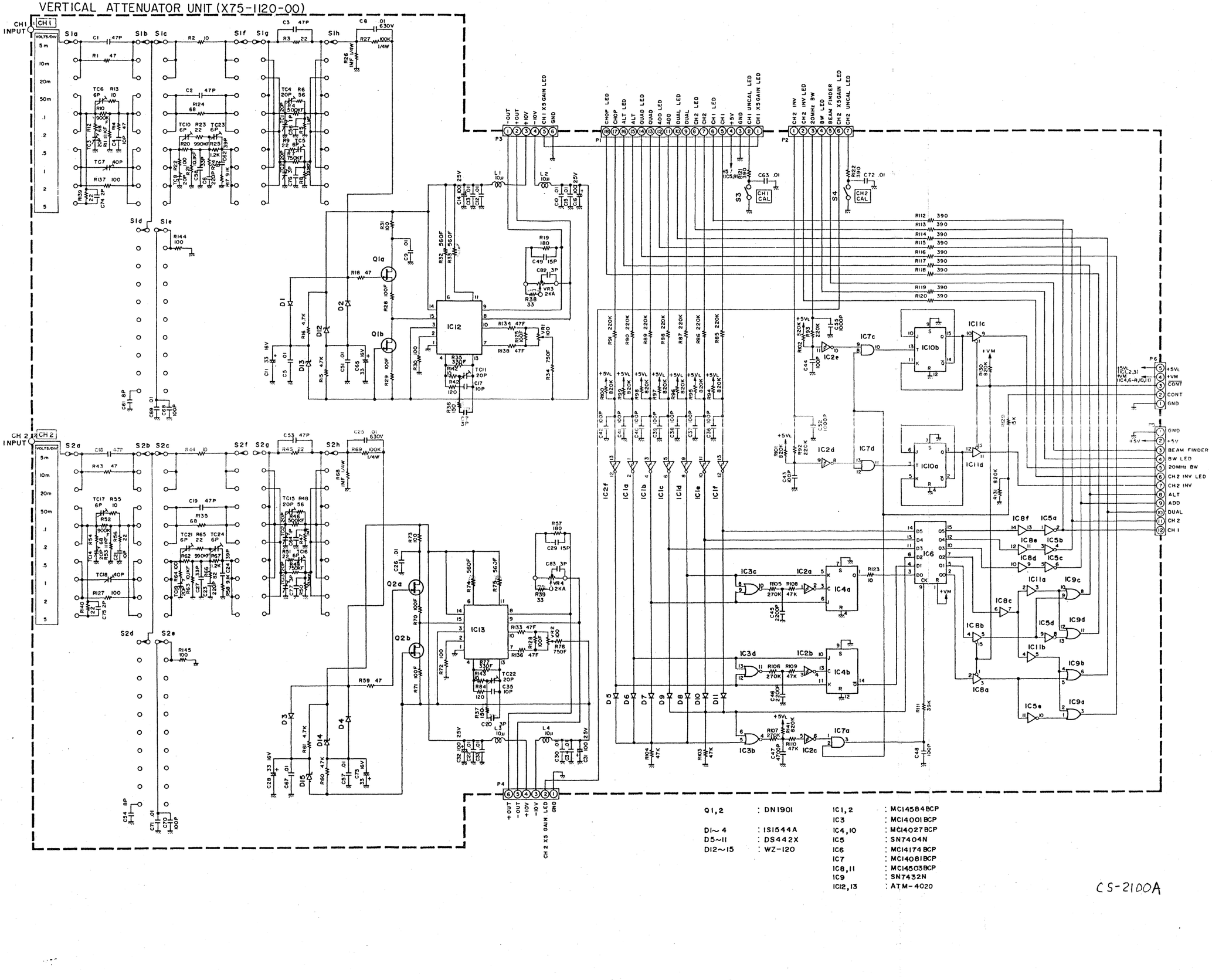

| | | | | | |
|---|---|---|---|---|---|
| IC1 | : MC14584BCP | IC6 | : SN7442AN | Q1~4,7 | : 2SC536KNP(F) |
| IC2 | : MC14069UBCP | IC7 | : MC14013BCP | Q5,6,10~12 | : 2SA608KNP(F) |
| IC3 | : MC14001BCP | IC8 | : MC14011BCP | Q13,17 | : DN1901 |
| IC4 | : MC14174BCP | IC9 | : SN74LS04N | Q14,15,18,19 | : 2SC1215 (T or S) |
| IC5 | : MC14503BCP | IC17 | : FS7805L or MC78L05CP | Q16,20 | : 2SD438(F) |

D1~24, 31, 39, 40, 42~46, 48~54 : DS442X
D38 : IN60
D41, 47 : IS1544A

CS-2100A

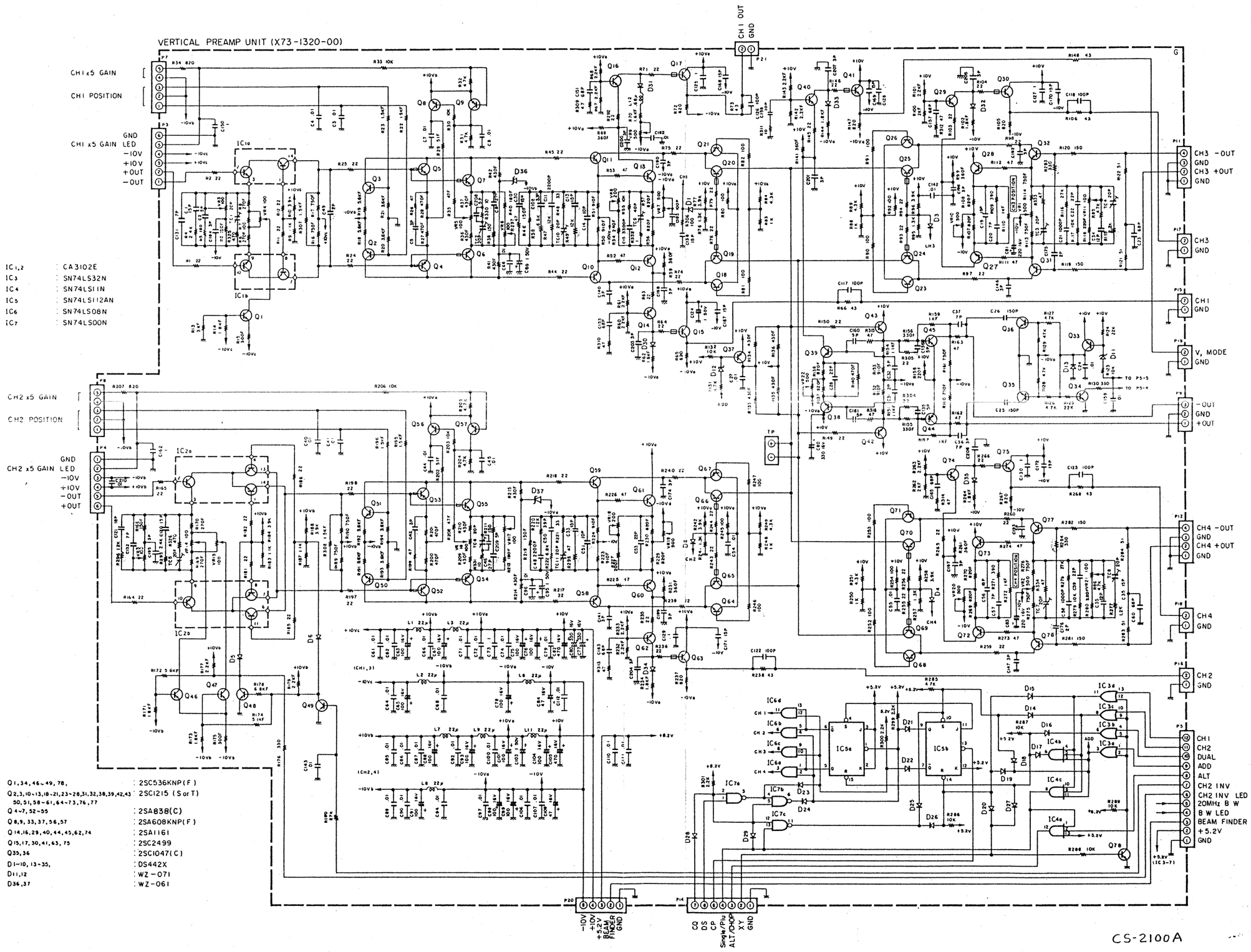
A'

# VERTICAL ATTENUATOR UNIT (X75-1120-00)




| | | | |
|---|---|---|---|
| Q1,2 | : DN1901 | IC1,2 | : MC14584BCP |
| | | IC3 | : MC14001BCP |
| D1~4 | : 1S1544A | IC4,10 | : MC14027BCP |
| D5~11 | : DS442X | IC5 | : SN7404N |
| D12~15 | : WZ-120 | IC6 | : MC14174BCP |
| | | IC7 | : MC14081BCP |
| | | IC8,11 | : MC14503BCP |
| | | IC9 | : SN7432N |
| | | IC12,13 | : ATM-4020 |

CS-2100A


VERTICAL PREAMP UNIT (X73-1320-00)
CH1 x5 GAIN
CH1 POSITION
GND
CH1 x5 GAIN LED
-10V
+10V
+OUT
-OUT
CH2 x5 GAIN
CH2 POSITION
GND
CH2 x5 GAIN LED
-10V
+10V
-OUT
+OUT
CH1 OUT
GND
CH3 -OUT
GND
CH3 +OUT
GND
CH3
GND
CH1
GND
V, MODE
GND
-OUT
GND
+OUT
CH4 -OUT
GND
CH4 +OUT
GND
CH4
GND
CH2
GND
CH1
CH2
DUAL
ADD
ALT
CH2 INV
CH2 INV LED
20MHz B W
B W LED
BEAM FINDER
+5.2V
GND
TO P5-5
TO P5-4
-10V
+10V
+5.2V
BEAM FINDER
GND
CQ
DS
CP
Single/Plu
ALT/CHOP
XY
GND
IC1,2 : CA3102E
IC3 : SN74LS32N
IC4 : SN74LS11N
IC5 : SN74LS112AN
IC6 : SN74LS08N
IC7 : SN74LS00N
Q1,34,46~49,78, : 2SC536KNP(F)
Q2,3,10~13,18~21,23~28,31,32,38,39,42,43 50,51,58~61,64~73,76,77 : 2SC1215 (S or T)
Q4~7, 52~55 : 2SA838(C)
Q8,9, 33, 37, 56, 57 : 2SA608KNP(F)
Q14,16,29,40,44,45,62,74 : 2SA1161
Q15,17, 30, 41, 63, 75 : 2SC2499
Q35,36 : 2SC1047(C)
D1~10, 13~35, : DS442X
D11,12 : WZ-071
D36,37 : WZ-061
CS-2100A

# CS-2100A SERVICE MANUAL CHANGE INFORMATION :

At Trio, we continually strive to keep up with latest electronic developements by adding circuit and component improvement to our instruments as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we can't get these change immediately into printed manual.

Also, a single change may affect several section.
Since the change information sheets are permanently entered, some duplication may occur.

Because of the universal parts procurement problem, some electrical parts in your instrument may be different from those described in the replaceable electrical parts list. (Main chassis)

# PARTS LIST

Note: A: Addition
C: Change
D: Deletion

## S/No. 2120001 ~

### VERTICAL ATT UNIT (X75-1120-00)

| Ref. No. | Parts No. | Name & Description | | | | Note |
|---|---|---|---|---|---|---|
| R32 | RN14BK2B5600F | RN | 560Ω | ± 1% | 1/8W | C |
| R33 | RN14BK2B5600F | RN | 560Ω | ± 1% | 1/8W | C |
| R74 | RN14BK2B5600F | RN | 560Ω | ± 1% | 1/8W | C |
| R75 | RN14BK2B5600F | RN | 560Ω | ± 1% | 1/8W | C |
| IC12 | | IC | ATM-4020 | | | |
| IC13 | | IC | ATM-4020 | | | C |

### VERTICAL PREAMPLIFIER (X73-1320-00)

| Ref. No. | Parts No. | Name & Description | | | | Note |
|---|---|---|---|---|---|---|
| R167 | RD14BB2C181J | RD | 180Ω | ± 5% | 1/6W | C |
| R168 | RD14BB2C682J | RD | 6.8 kΩ | ± 5% | 1/6W | D |
| R296 | RD14BB2C122J | RD | 1.2 kΩ | ± 5% | 1/6W | A |
| C5 | CC45CH1H020C | CC | 2 pF | ± 0.25 pF | 50WV | C |
| C38 | CC45CH1H220J | CC | 22 pF | ± 5% | 50WV | C |
| C39 | CC45CH1H330J | CC | 33 pF | ± 5% | 50WV | D |
| C42 | CC45CH1H020C | CC | 2 pF | ± 0.25 pF | 50WV | C |
| C120 | CC45CH1H330J | CC | 33 pF | ± 5% | 50WV | C |
| C121 | CC45CH1H180J | CC | 18 pF | ± 5% | 50WV | A |
| C132 | CC45CH1H270J | CC | 27 pF | ± 5% | 50WV | C |

### VERTICAL OUTPUT AMP (X73-1330-00)

| Ref. No. | Parts No. | Name & Description | | | | Note |
|---|---|---|---|---|---|---|
| R1 | RN14BK2B1000F | RN | 100Ω | ± 1% | 1/8W | C |
| R2 | RN14BK2B1000F | RN | 100Ω | ± 1% | 1/8W | C |
| R42 | RD14BB2C271J | RD | 270Ω | ± 5% | 1/6W | C |

## S/No. 3010001 ~

### VERTICAL ATT UNIT (X75-1120-00)

| Ref. No. | Parts No. | Name & Description | | | | Note |
|---|---|---|---|---|---|---|
| R36 | RD14BB2C151J | RD | 150Ω | ± 5% | 1/6W | A |
| R37 | RD14BB2C151J | RD | 150Ω | ± 5% | 1/6W | A |
| R38 | RD14BB2C330J | RD | 33Ω | ± 5% | 1/6W | A |
| R39 | RD14BB2C330J | RD | 33Ω | ± 5% | 1/6W | A |
| C7 | CC45CH1H030C | CC | 3 pF | ± 0.25 pF | 50WV | A |
| C20 | CC45CH1H030C | CC | 3 pF | ± 0.25 pF | 50WV | A |

# PARTS LIST

## VERTICAL PREAMPLIFIER (X73-1320-00)

| Ref. No. | Parts No. | Name & Description | | | | Note |
|---|---|---|---|---|---|---|
| R3 | RN14BK2B1500F | RN | 150Ω | ± 1% | 1/8W | C |
| R38 | RD14BB2C151J | RD | 150Ω | ± 5% | 1/6W | C |
| R49 | RD14BB2C123J | RD | 12 kΩ | ± 5% | 1/6W | C |
| R115 | RD14BB2C102J | RD | 1 kΩ | ± 5% | 1/6W | C |
| R166 | RN14BK2B1500F | RN | 150Ω | ± 1% | 1/8W | C |
| R167 | RD14BB2C241J | RD | 240Ω | ± 5% | 1/6W | D |
| R211 | RD14BB2C151J | RD | 150Ω | ± 5% | 1/6W | C |
| R277 | RD14BB2C102J | RD | 1 kΩ | ± 5% | 1/6W | C |
| R293 | RD14BB2C331J | RD | 330Ω | ± 5% | 1/6W | A |
| R294 | RD14BB2C331J | RD | 330Ω | ± 5% | 1/6W | A |
| R295 | RD14BB2C242J | RD | 2.4 kΩ | ± 5% | 1/6W | C |
| R297 | RD14BB2C470J | RD | 47Ω | ± 5% | 1/6W | A |
| R298 | RD14BB2C470J | RD | 47Ω | ± 5% | 1/6W | A |
| R325 | RD14BB2C471J | RD | 470Ω | ± 5% | 1/6W | C |
| R326 | RD14BB2C471J | RD | 470Ω | ± 5% | 1/6W | C |
| R317 | RD14BB2C473J | RD | 47kΩ | ± 5% | 1/6W | D |
| R318 | RD14BB2C473J | RD | 47kΩ | ± 5% | 1/6W | D |
| R319 | RD14BB2C103J | RD | 10kΩ | ± 5% | 1/6W | D |
| R320 | RD14BB2C822J | RD | 8.2kΩ | ± 5% | 1/6W | D |
| R321 | RD14BB2C103J | RD | 10kΩ | ± 5% | 1/6W | D |
| R322 | RD14BB2C103J | RD | 10kΩ | ± 5% | 1/6W | D |
| R323 | RD14BB2C752J | RD | 7.5kΩ | ± 5% | 1/6W | D |
| R324 | RD14BB2C332J | RD | 3.3kΩ | ± 5% | 1/6W | D |
| C2 | CC45CH1H050C | CC | 5 pF | ± 0.25 pF | 50WV | C |
| C9 | CC45CH1H270J | CC | 27 pF | ± 5 pF | 50WV | C |
| C13 | CC45CH1H150J | CC | 15 pF | ± 5 pF | 50WV | C |
| C14 | CC45CH1H100J | CC | 10 pF | ± 5 pF | 50WV | C |
| C15 | CK45B1H332K | CK | 3300 pF | ± 10% | 50WV | C |
| C30 | CC45CH1H150J | CC | 15 pF | ± 5% | 50WV | A |
| C33 | CC45CH1H150J | CC | 15 pF | ± 5% | 50WV | A |
| C34 | CC45CH1H120J | CC | 12 pF | ± 5% | 50WV | C |
| C35 | CC45CH1H120J | CC | 12 pF | ± 5% | 50WV | C |
| C38 | CC45CH1H330J | CC | 33 pF | ± 5% | 50WV | D |
| C46 | CC45CH1H270J | CC | 27 pF | ± 5% | 50WV | C |
| C49 | CC45CH1H020J | CC | 2 pF | ± 0.25 pF | 50WV | A |
| C51 | CC45CH1H100J | CC | 10 pF | ± 5% | 50WV | C |
| C120 | CC45CH1H150J | CC | 15 pF | ± 5% | 50WV | C |
| C131 | CC45CH1H070D | CC | 7 pF | ± 0.5 pF | 50WV | C |
| C132 | CC45CH1H070D | CC | 7 pF | ± 0.5 pF | 50WV | C |
| C135 | CC45CH1H050C | CC | 5 pF | ± 0.25 pF | 50WV | C |
| C136 | CC45CH1H050C | CC | 5 pF | ± 0.25 pF | 50WV | C |
| C175 | CC45CH1H030C | CC | 3 pF | ± 0.25 pF | 50WV | A |
| C176 | CC45CH1H030C | CC | 3 pF | ± 0.25 pF | 50WV | A |
| TH1 | | Thermistor SDT-1000 | | | | D |
| D40 | | Diode | IS2686 | | | D |
| D41 | | Diode | IS2686 | | | D |
| D42 | | Diode | IS2686 | | | D |
| D43 | | Diode | IS2686 | | | D |
| D44 | | Diode | DS442X | | | D |
| Q79 | | TR | 2SC536KNP (F) | | | D |

## VERTICAL OUTPUT AMP (X73-1330-00)

| Ref. No. | Parts No. | Name & Description | | | | Note |
|---|---|---|---|---|---|---|
| R12 | RD14BB2C302J | RD | 3kΩ | ± 5% | 1/6W | D |
| R13 | RD14BB2C122J | RD | 1.2kΩ | ± 5% | 1/6W | D |
| R16 | RN14BK2E6200F | RN | 620Ω | ± 1% | 1/8W | D |
| R17 | RN14BK2E6200F | RN | 620Ω | ± 1% | 1/8W | D |
| R23 | RD14BB2C101J | RD | 100Ω | ± 5% | 1/6W | A |
| R24 | RD14BB2C220J | RD | 22Ω | ± 5% | 1/6W | A |
| R29 | RD14BB2E150J | RD | 15Ω | ± 5% | 1/4W | C |
| R34 | RD14BB2C471J | RD | 470Ω | ± 5% | 1/6W | D |
| R37 | RD14BB2C471J | RD | 470Ω | ± 5% | 1/6W | D |

# PARTS LIST

| Ref. No. | Parts No. | Name & Description | | | | Note |
|---|---|---|---|---|---|---|
| R40 | RD14BB2C181J | RD | 180Ω | ± 5% | 1/6W | C |
| R46 | RD14BB2C181J | RD | 180Ω | ± 5% | 1/6W | C |
| R49 | RD14BB2C561J | RD | 560Ω | ± 5% | 1/6W | C |
| R51 | RD14BB2C471J | RD | 470Ω | ± 5% | 1/6W | A |
| R52 | RD14BB2C471J | RD | 470Ω | ± 5% | 1/6W | A |
| R55 | RD14BB2C221J | RD | 220Ω | ± 5% | 1/6W | A |
| R56 | RD14BB2C470J | RD | 47Ω | | | A |
| R57 | RD14BB2C101J | RD | 100Ω | | | A |
| R58 | RD14BB2C621J | RD | 620Ω | ± 5% | 1/6W | A |
| R59 | RD14BB2C621J | RD | 620Ω | ± 5% | 1/6W | A |
| R60 | RN14BK2B3600F | RN | 360Ω | ± 1% | 1/8W | A |
| R61 | RN14BK2B3600F | RN | 360Ω | ± 1% | 1/8W | A |
| C18 | CC45CH1H070D | CC | 7 pF | ± 0.5 pF | 50WV | D |
| C19 | CK45B1H102K | CK | 1000 pF | ± 10% | 50WV | C |
| C20 | CC45CH1H050C | CC | 5 pF | ± 0.25pF | 50WV | C |
| C23 | CC45CH1H150J | CC | 15 pF | ± 5% | 50WV | A |
| C24 | CC45CH1H100J | CC | 10 pF | ± 5% | 50WV | A |
| L1 | L40-2282-13 | Ferri-inductor | 0.22 μH | | | D |
| L2 | L33-0806-05 | Ferri-inductor | 0.52 μH | | | C |
| L4 | L40-2282-13 | Ferri-inductor | 0.22 μH | | | D |
| L5 | L33-0806-05 | Ferri-inductor | 0.52 μH | | | C |
| L8 | L40-1011-03 | Ferri-inductor | 100 μH | | | D |
| D1 | | Diode DS442X | | | | A |
| Q3 | | TR | 2SC1215 (Sor T) | | | C |
| Q4 | | TR | 2SC1215 (Sor T) | | | C |
| Q6 | | TR | 2SC1047 (C) | | | A |
| Q15 | | TR | 2SA838 (C) | | | A |

HORIZONTAL MODE CONTROL (X77-1130-00)

| Ref. No. | Parts No. | Name & Description | | | | Note |
|---|---|---|---|---|---|---|
| C47 | CC45CH1H070D | CC | 7 pF | ± 0.5 pF | 50WV | C |
| C48 | CC45CH1H070D | CC | 7 pF | ± 0.5 pF | 50WV | C |

## S/No. 3020001 ~

### VERTICAL PREAMP (X73-1320-00)

| Ref. No. | Parts No. | Name & Description | | | | Note |
|---|---|---|---|---|---|---|
| R115 | RD14BB2C222J | RD | 2.2kΩ | ± 5% | 1/6W | C |
| R277 | RD14BB2C122J | RD | 1.2kΩ | ± 5% | 1/6W | C |
| C5 | CC45CH1H030C | CC | 3 pF | ± 0.25 pF | 50WV | C |
| C42 | CC45CH1H030C | CC | 3 pF | ± 0.25 pF | 50WV | C |
| C108 | CC45CH1H330J | CC | 33 pF | ± 5% | 50WV | C |
| C119 | CC45CH1H101J | CC | 100 pF | ± 5% | 50WV | D |
| C175 | CC45CH1H020C | CC | 2 pF | ± 0.25 pF | 50WV | C |
| C176 | CC45CH1H020C | CC | 2 pF | ± 0.25 pF | 50WV | C |
| C208 | CC45CH1H050C | CC | 5 pF | ± 0.25 pF | 50WV | A |
| C209 | CC45CH1H050C | CC | 5 pF | ± 0.25 pF | 50WV | A |
| C210 | CK45B1H103K | CK | 0.01μF | ± 10% | 50WV | A |

### VERTICAL OUTPUT AMP (X73-1330-00)

| Ref. No. | Parts No. | Name & Description | | | | Note |
|---|---|---|---|---|---|---|
| R62 | RD14BB2C220J | RD | 22 Ω | ± 5% | 1/6W | A |
| R63 | RD14BB2C220J | RD | 22 Ω | ± 5% | 1/6W | A |
| R29 | RD14BB2E100J | RD | 10 Ω | ± 5% | 1/4W | C |
| C20 | CC45CH1H070D | CC | 7 pF | ± 0.5 pF | 50WV | C |
| C25 | CC45CH1H331J | CC | 330 pF | ± 5% | 50WV | A |
| C26 | CC45CH1H331J | CC | 330 pF | ± 5% | 50WV | A |
| C27 | CC45CH1H020C | CC | 2 pF | ± 0.25 pF | 50WV | A |

### POWER BLANKING (X68-1310-00)

| Ref. No. | Parts No. | Name & Description | | Note |
|---|---|---|---|---|
| Q1 | | TR | 2SC2591 (Q or R) | C |